

PC

The Independent Guide to
IBM Personal Computers

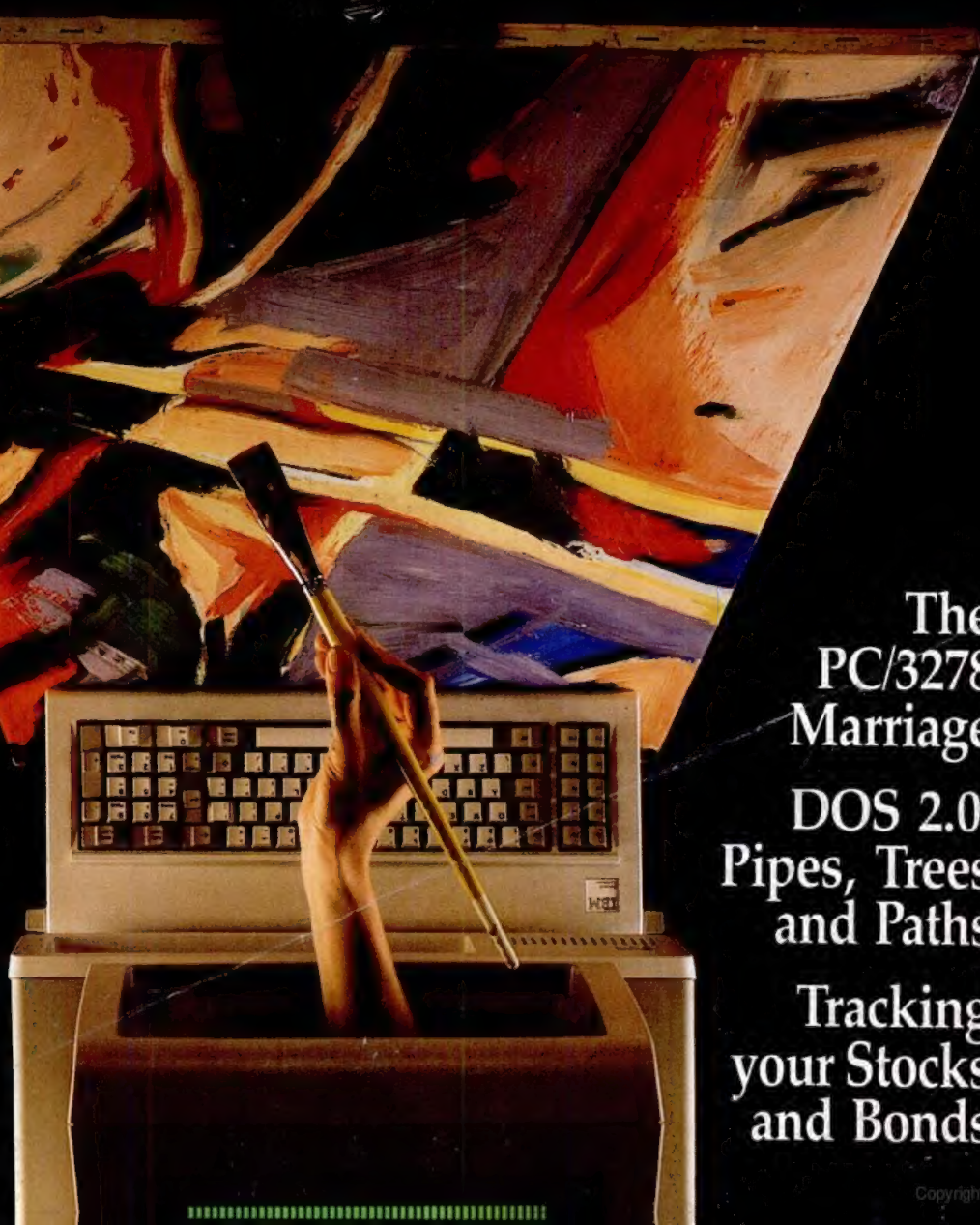
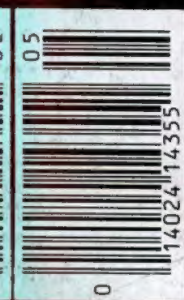
Volume 1 Number 12 \$2.95

PAINTING WITH YOUR PC

Computer Art
and a
Graphics Primer

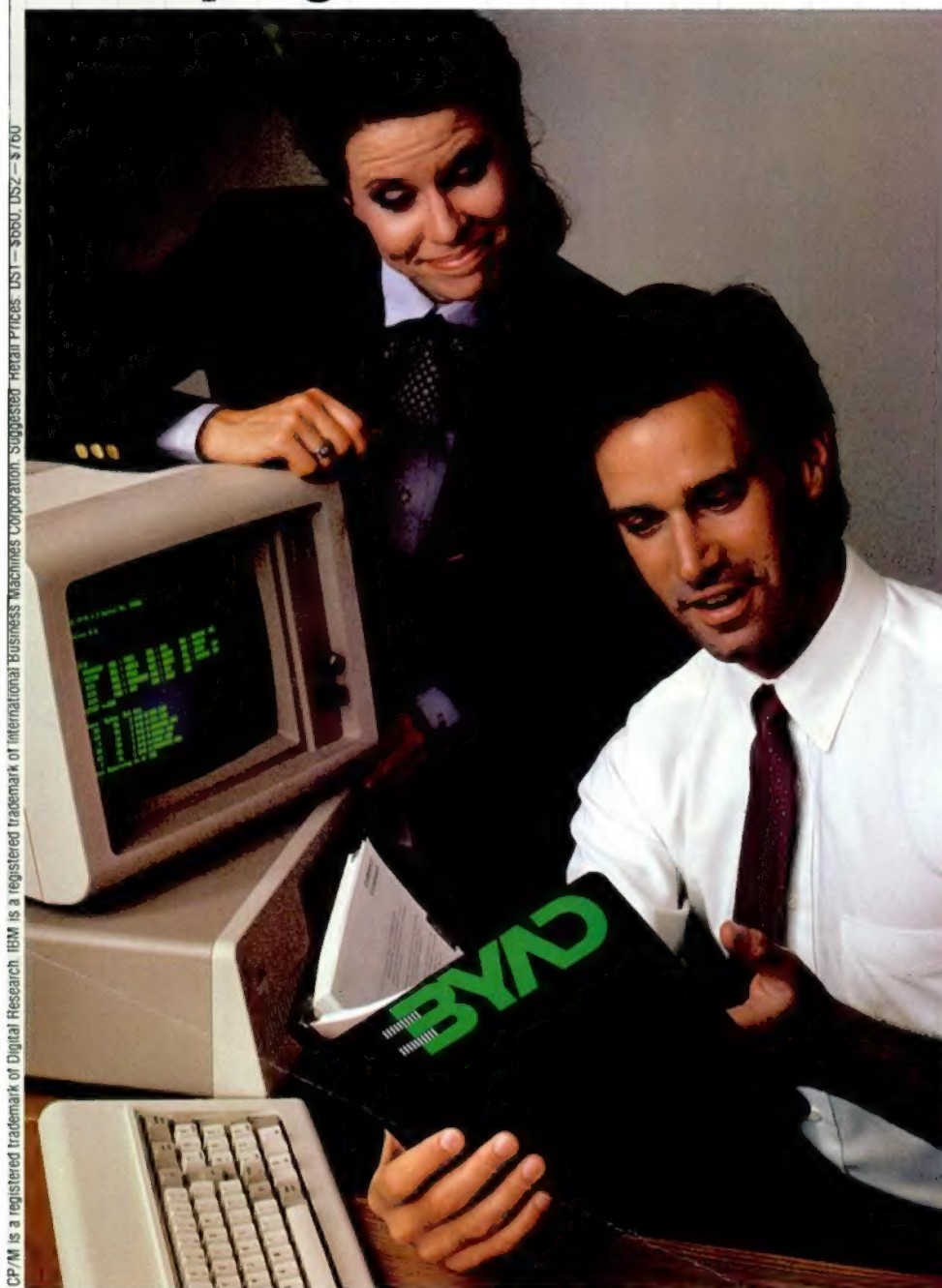
INSIDE
THE NEW PC-XT

Five
Time
Managers
All About
Product
Warranties



The
PC/3278
Marriage
DOS 2.0:
Pipes, Trees
and Paths
Tracking
your Stocks
and Bonds

**"Yes, it's my new IBM...
but wait till you see how
fast it runs my favorite
CP/M programs!"**



It's nice learning to use your own IBM PC while getting ready for all of the exciting programs that are being developed for it. But it's doubly nice to know that the vast array of CP/M programs can run now... while you're waiting.

The Byad DS1 Expansion Circuit Board provides a Z80B microprocessor and the CP/M operating system enabling you to run CP/M programs faster and better than ever.

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To run CP/M simply boot the CP/M operating system and select from the familiar CP/M commands.

Just plug in Byad, sit back, and enjoy the wait.

BYAD

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312 381-2330

System Requirement

Minimum requirement 48K RAM, single 5 1/4 diskette drive, monochrome display. Additionally second diskette drive, double-sided drives, parallel printer, asynchronous communications adapter, 64K RAM on system board and user configured I/O devices are supported.

Hardware

Memory—64K x 9 bit dynamic RAM.

Processor—Z80B with clock cycle of 4.77 MHz with no wait-states. Z80 communicates with the 8088 using interrupt structure of the IBM-PC. DS2 version also includes a serial port with current loop and RS232 and RS422 interfaces.

Software

Digital Research Corp. CP/M 2.2 (suggested retail price \$150) configured for a 64K memory system, includes CP/M utilities.

Byad Utilities:

SETUP System configuration—number of disk drive buffers, size of printer, communications buffers and other system parameters

FORMAT

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FILEX

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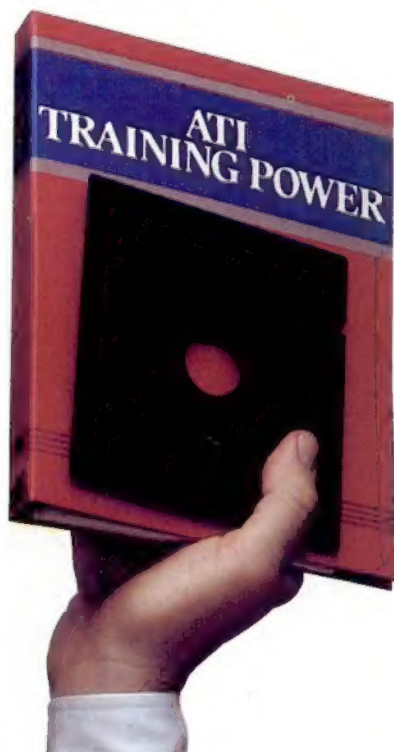
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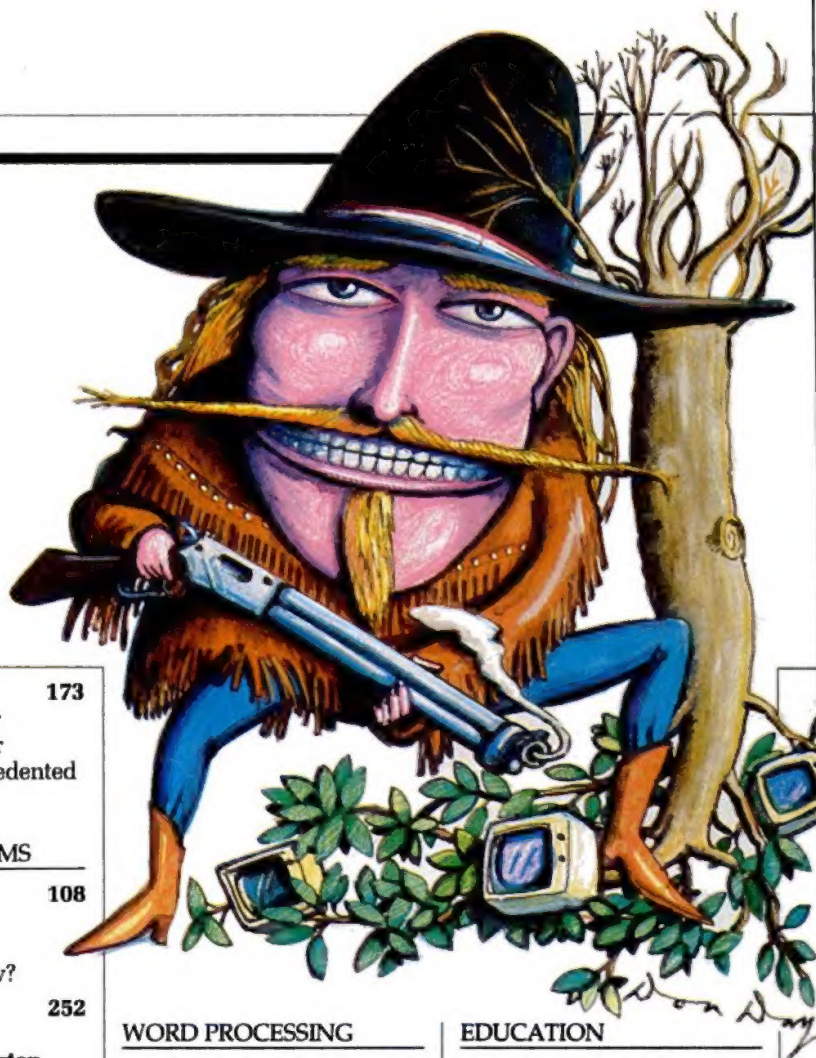
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The Independent Guide to
IBM Personal Computers

Volume 1 Number 12



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Your kids will visit the Metalican Auction where they'll trade with the aliens for valuable chips. Your kids will then use these chips to buy things they'll need for their trip. And your kids will learn how to fly over the planet using their jet pack.

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IN SEARCH OF THE MOST AMAZING THING is written by Tom Snyder, educator and author of the best-selling *Snooper Troops*™ Detective Series.

And like all Spinnaker games, *IN SEARCH OF THE MOST AMAZING THING* has real educational value. For instance, your kids will sharpen their ability to estimate distances and

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They'll learn all of these things, plus they'll learn that nothing is impossible if you put your mind to it.

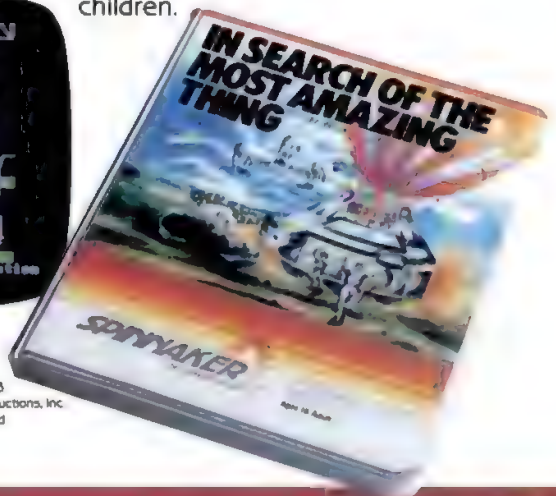
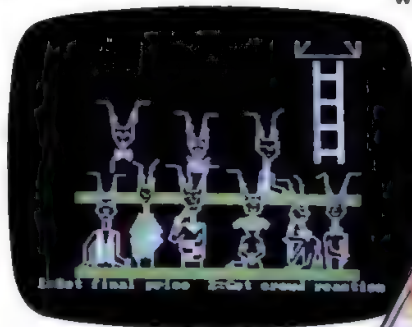
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Parental Discretion Advised.

If you're a parent who would rather see your kids reason with aliens than destroy them, you've got plenty of reasons to ask your local software retailer for *IN SEARCH OF THE MOST AMAZING THING*. It's compatible with Apple,® IBM,® Atari,® and Commodore 64™ computers. And it offers so much fun you'll probably be tempted to play it yourself. Or you can write us directly at: Spinnaker Software, 215 First Street, Cambridge, MA 02142.

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So which is which? Simple.

On the left is the IBM Personal Computer, starting with 64KB of user memory (expandable to 640KB) and two optional 5¼" diskette drives.

It can easily satisfy your computing needs at the office, at home or in school.

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(You can even make it function like the computer shown on the right by adding an expansion unit that houses one or two 10-million-character fixed disk drives.)

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The IBM Personal Computer

which is which.

On the right is the IBM Personal computer XT, starting with 128KB of user memory (expandable to 640KB), 5¼" 360KB diskette drive *plus* a standard 10-million-character fixed disk drive that's *already* built in.

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And by adding an expansion unit with a second 10-megabyte fixed disk drive, you get even more high-volume capacity from the system.

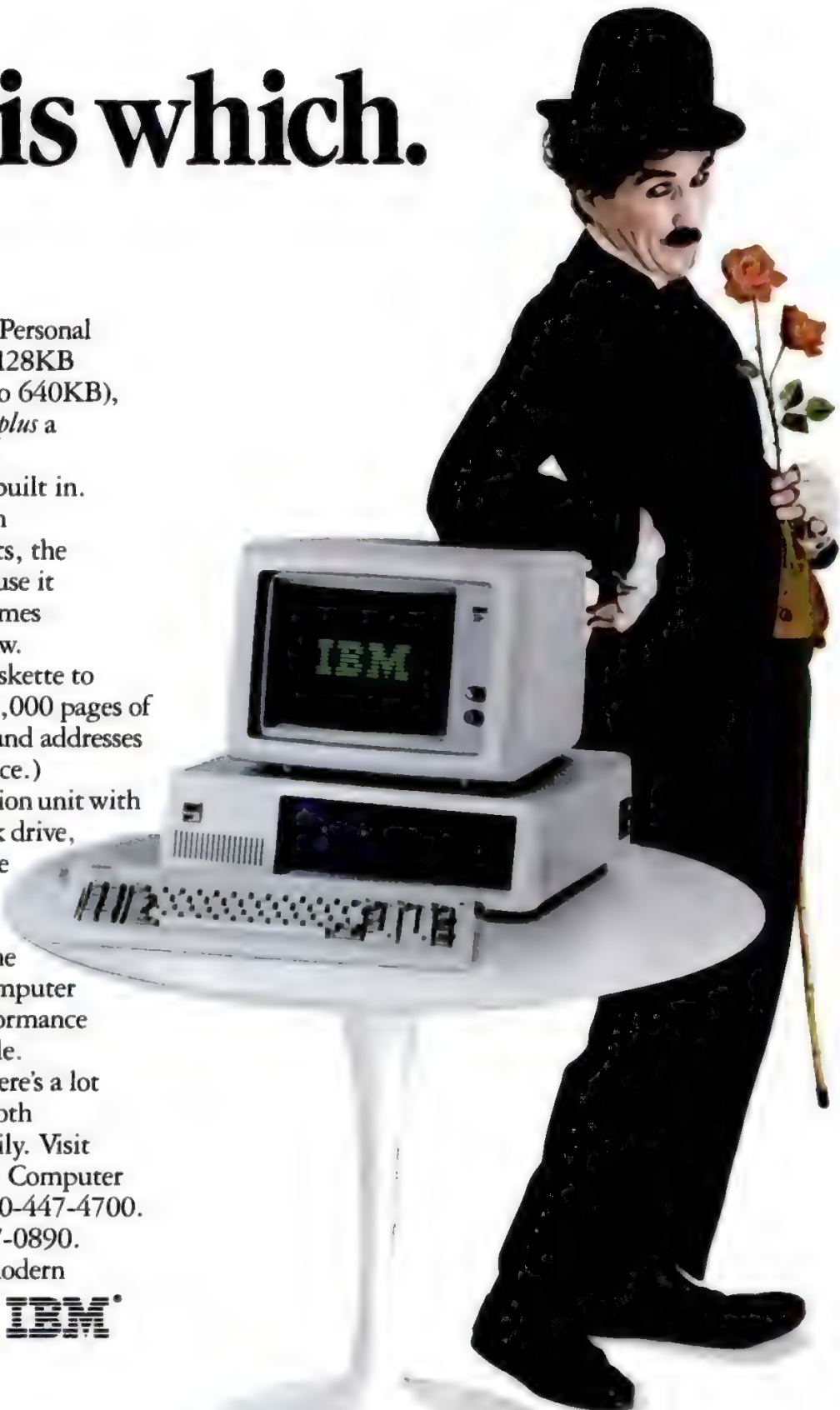
XT can run most of the same software and accept most of the same IBM hardware as the computer on the left. And its price/performance is nothing less than remarkable.

But for you to choose, there's a lot to learn about both members of this growing family. Visit your authorized IBM Personal Computer dealer. To learn where, call 800-447-4700. In Alaska or Hawaii, 800-447-0890.

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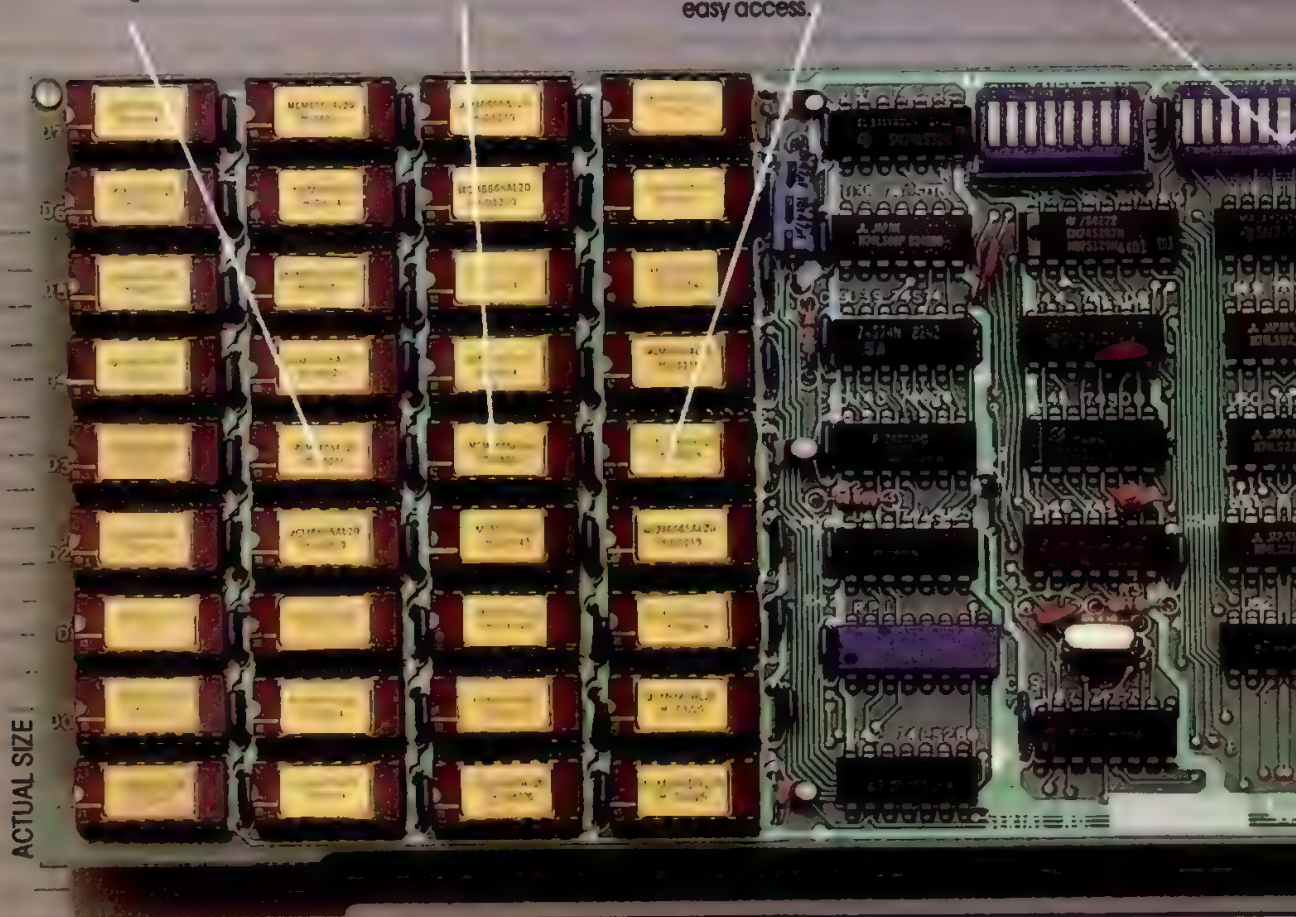
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Easy to use

Quadlink is a board that plugs inside the IBM PC. After it's installed, you're in business. It's like having an Apple 64K computer inside your IBM.

Don't convert or re-format any diskettes. Load the Apple software into the IBM PC and key in one command. That puts you in the Apple

mode. And you're ready to go. When ready to switch back, just press a different key. It's that simple.

Keep the extras

Of course, Quadlink allows use of all IBM enhancements while running Apple software. That means printers, buffers, monitors and more.

When using a monitor with Quadlink there's no plugging and unplugging cables. And Apple programs will appear on an IBM Monochrome or color monitor just as clearly as on Apple's own screen. Even while working with Apple's high resolution color graphics, quality won't be diminished.

Explore your options

Quadlink, essentially a simulated Apple computer, comes standard with 64K memory. Requiring only one expansion slot, it offers a parallel port designed to operate most printers and parallel devices. A serial port for connecting modems, printers and other serial accessories. And a game port for a variety of entertainment options. And

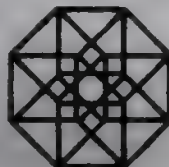
it's both IBM and Apple compatible. There's nothing like Quadlink. And nothing like reliable Quadram Quality to stand behind it.

Beyond the limits

Quadlink by Quadram opens a whole new world of possibilities for IBM PC owners. There's no reason for software limitations any longer. If you like what IBM has to offer but hesitate to give up Apple's educational programs or games, explore Quadlink. And get the best of both worlds.

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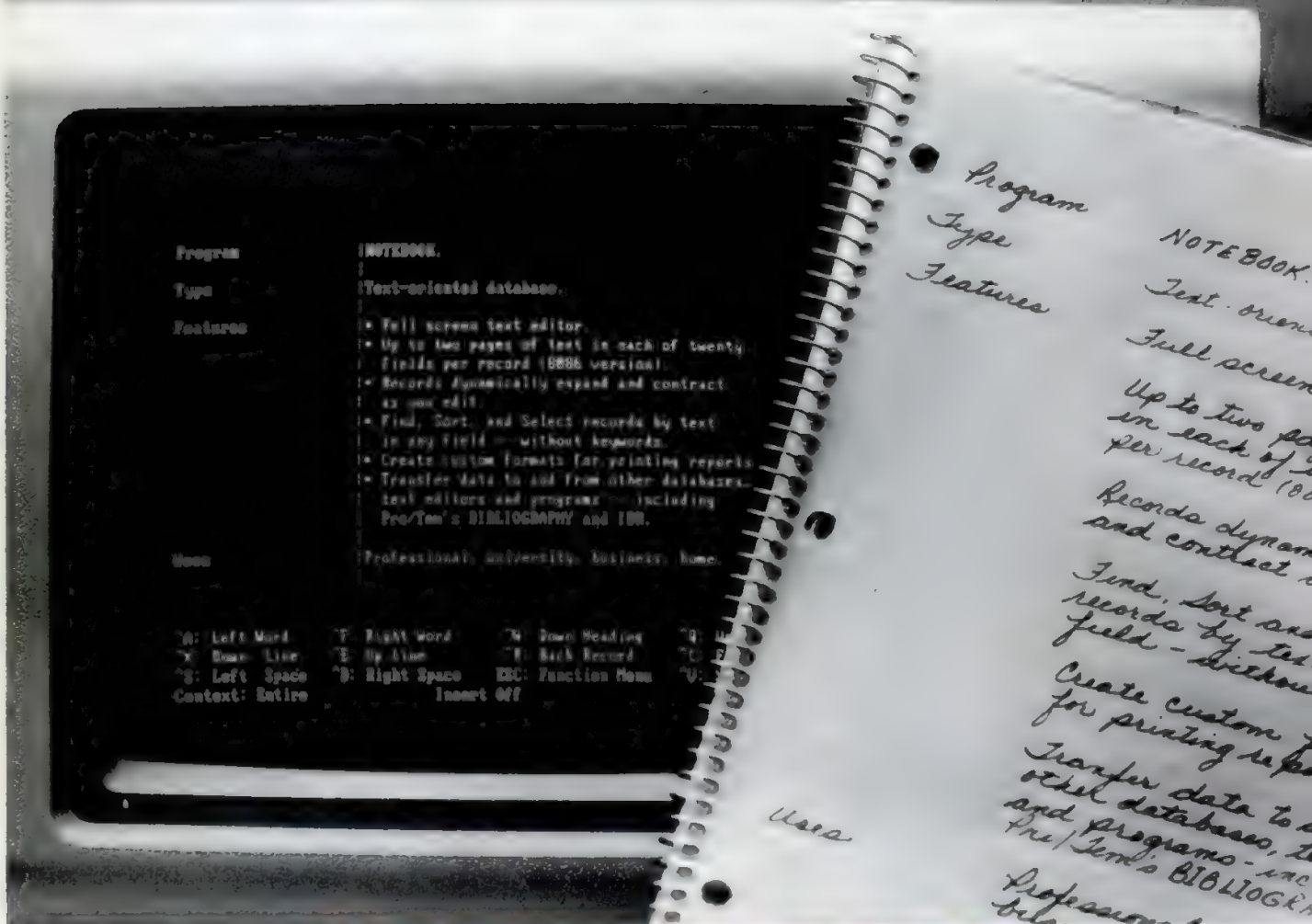
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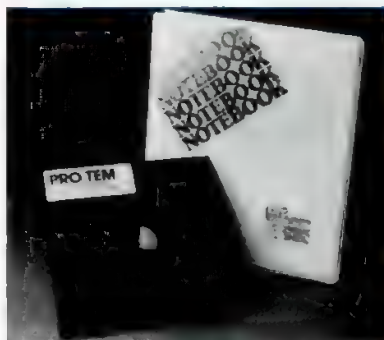
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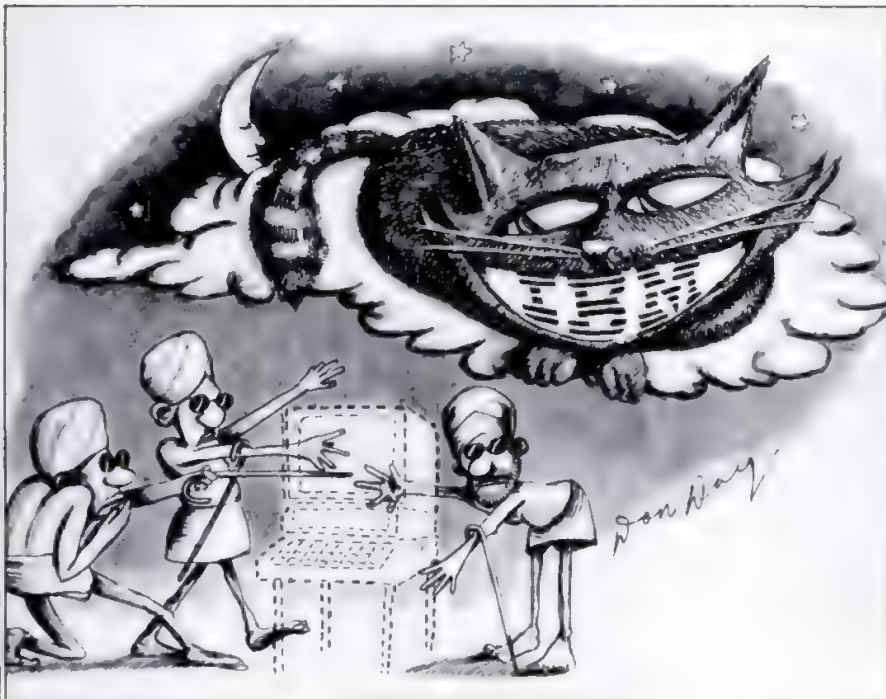
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The Computer That Came In From The Cold



Against his broad and sturdy side,
At once began to bawl,
'God bless me! but the elephant
Is very like a wall!'

The second blind man feels the tusk, so smooth and sharp, and decides that the elephant "Is very like a spear!" The third man found the trunk and spake, "the elephant is very like a snake!" The fourth, a knee, which led him to think of a tree. The fifth, an ear, which he mistook for a fan. And the sixth, a swinging tail did grope, and decided in his wisdom it was a rope.

Well, we have been in the eye of a hurricane of rumors here at PC lately. Hardly a day went by in January, February, and

WE HAVE
*been in the eye of a
hurricane of rumors here
at PC lately.*

Covering IBM is a bit like conducting a daily interview with a silent Buddha. At midnight. Blindfolded.

Oh, of course there are occasional flashes of light here and there, and sometimes enough of a burst to catch a shadowy glimpse of something or other. The fact remains, however, that IBM can keep a secret until it is ready to turn on the lights. The people from Boca Raton by way of Armonk could give the CIA and the KGB lessons in Security 101.

So it has been in the last several months, as everybody knew that Big Blue was about to announce its first expansion of the PC line. IBM presumably knew, too, but the lights were still out.

The situation reminded me of the ancient Indian story of "The Blind Men and the Elephant," immortalized in the poem of the same name by John G. Saxe.

"The first approached the elephant,
And, happening to fall

early March that some hot new tip didn't arrive. The *Wall Street Journal* announced the "Peanut" (a scaled-down, low-price PC for the masses) in January, which seemed to excite everybody but IBM. Several of the other magazines in the micro-computer field read the entrails or sifted through the garbage and declared that

"PC-2" was about to be upon us. This machine was to be a super business device, and everybody just knew that it would use a new microprocessor—the 80186, or was it the 80286, or perhaps "the 68000," as one pundit confidently declared.

And then there were the announcement dates. One worldly magazine went out on a limb and said that it was certain that IBM would release the PC-2, or was it the Peanut, at the CES show in January. Later, that same magazine "discovered" that IBM "never" announces anything at a show. One inside source at Big Blue

(sources do exist, even though the tidbits they throw are mighty small) confided that the PR staff at CES was besieged by reporters and buyers demanding to know why IBM had decided to hold back on its "promised" announcement.

In any case, we finally began to believe there was an elephant moving in the bushes when we unofficially discovered that IBM had scheduled a series of briefings for dealers in early March. Of course, the company would not confirm this, but we eventually received a heart-fluttering, stop-the-presses acknowledgement from a source deep within IBM (Deep Blue?) that

something would happen on March 8 in New York. Coffee at 9:30 a.m., something at 10 a.m., we learned. We would receive a Mailgram on March 7 with the formal invitation, we were told.

Well, the Mailgram never arrived but we went to the Grand Hyatt Hotel in New York anyway. There was the coffee, and there was a coterie of IBM public relations people, and there, outside the closed doors of a rented conference room, stood a pair of broad-shouldered security guards. The something was inside, as were the press kits, so we talked about the weather

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O^{UTSIDE}

*the closed doors of a
rented conference room
stood a pair of broad-
shouldered security
guards.*

(unseasonably fair) until exactly 10 a.m. when the doors were opened.

And the lights went on and the Buddha smiled and there was the PC-XT. Not the Peanut. Not the Popcorn. Not the PC-2.

"And so these men of Indostan
Disputed loud and long,
Each in his own opinion
Exceeding stiff and strong,
Though each was partly in the right,
And all were in the wrong!

So, oft in theologic wars
The disputants, I ween,
Rail on in utter ignorance
Of what each other mean,
And prate about an elephant
Not one of them has seen!"

* * *

Our cover stories this month turn away from the hardware and talk about some fascinating applications of the PC: Art for Art's sake, and art for business's sake.

And yes, you'll learn the full details of the PC-XT, along with an appraisal of DOS 2.0 and several other interesting developments from IBM. We won't keep you in the dark.

—Corey Sandler

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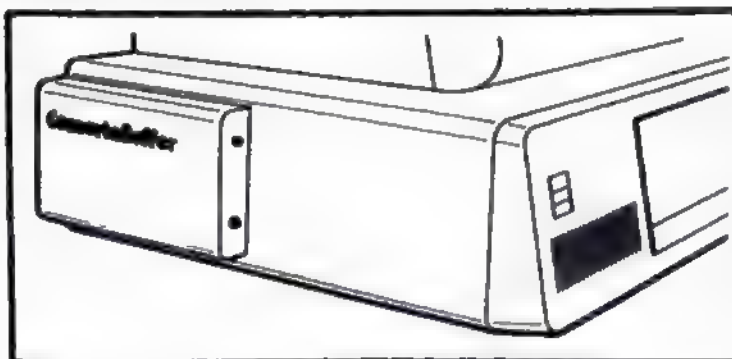


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CIRCLE 469 ON READER SERVICE CARD

ANNOUNCING THE END OF WORD PROCESSOR CONFUSION

It's one confusing business, choosing a word processor. All those companies assuring you theirs is the most fantastic one of all. And leaving you to cut through all the smoke and hopefully whittle them down to the best one for you.

Well, we can help. If you'll just invest the next three minutes reading this, we'll tell you about a word processor that makes picking the right one a real breeze.

FIRST, A WARNING. There are two things you must do when evaluating any word processor. First, be careful. It's no secret that many of today's claims about being easy to learn and use just don't stand up to careful comparison. Watch carefully for complicated codes and programs that require "training sessions." Secondly, be selective. Buy a word processor you can use on a daily basis, not one that requires another "training session" when someone goes on vacation. In other words, be very careful to select

the word processor that's absolutely the best and easiest to use. Which is what we'll now introduce you to.

WHY ONE WORD PROCESSOR MAKES THE MOST SENSE OF

THEM ALL. Meet WordPlus-PC. It's the advanced, "user-oriented" software package that turns your IBM-PC computer into a word processor equipped with the sophisticated capabilities of far larger, more expensive systems.

THE REMARKABLE

WORDPLUS-PC STORY. In a nutshell, it's this. WordPlus-PC was designed from the ground up to be the very latest in word processing technology. It has all the important features you

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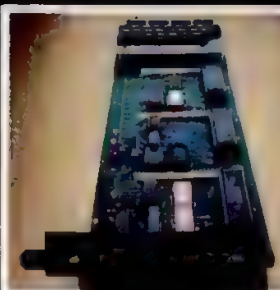
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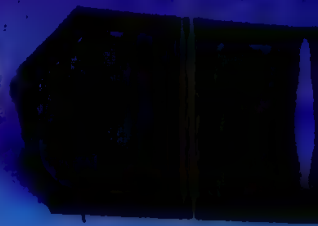
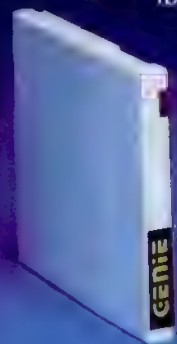
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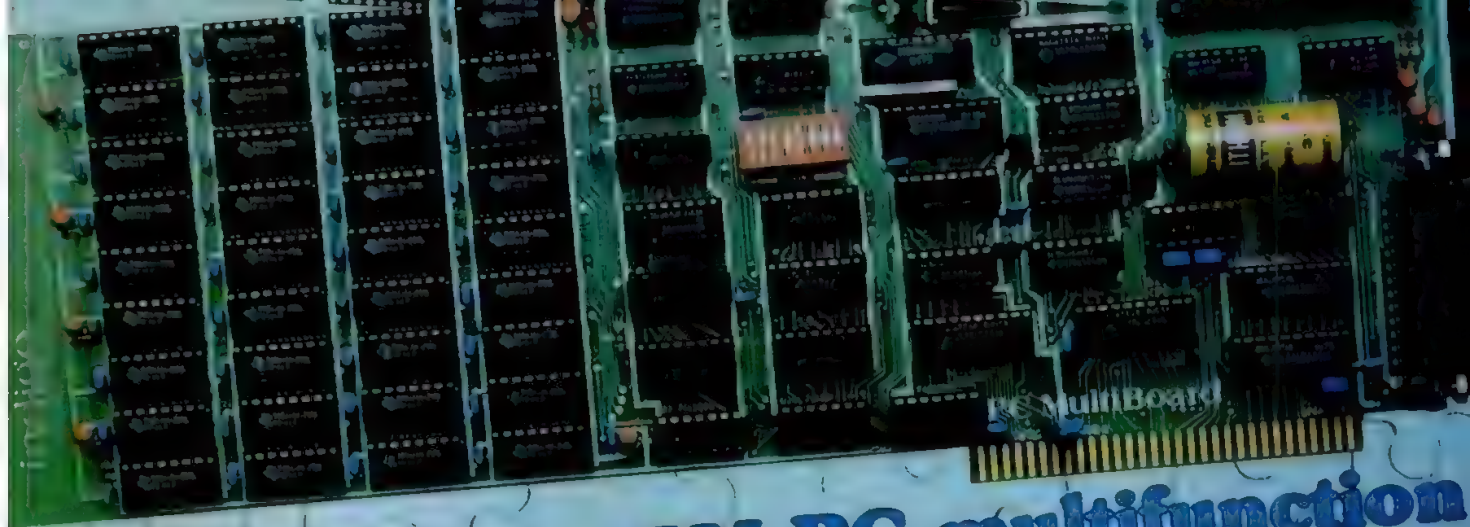
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CIRCLE 353 ON READER SERVICE CARD

Letters To PC

Designer Graphics

It would be a great help if you categorized graphics hardware, software and utilities under the following headings: Screen Graphics, Business Graphics, CAdesign, CADrafting, Rendering, and Image Processing. I'm tired of searching through long lists of \$2 pie chart programs to find one 3-D raster graphics program.

An architect or engineer uses many different kinds of graphics every day. We use PERT charts to schedule projects, charts and graphs to handle budgets, cartography to analyze city planning and site concerns, design drawings to formulate and analyze early plans, engineering drawings to communicate with contractors, and simulation to sell it all to the client and help him sell it to investors.

I'm disappointed that the computer industry has not yet perceived the sophistication and complexity of different graphic styles in common use. To computer vendors, it's all lumped in one bag as "graphics." This is conceptually the same as if architects lumped all the different kinds of computers together and called them "business machines."

Bob Davis
New York, New York

Thank you for your letter. We are planning a review of our subject headings—"eyebrows" in the parlance of PC—and we'll consider your suggestion.—Ed.

Soft Sell

Until recently, I took a passive, almost disinterested view of the dispute concerning copy protection. I am now against copy protection, unless a single backup copy is allowed by the program. The following experience demonstrates the need for backup flexibility.

Novatron, by Verisoft Works in Arizo-

na, comes without DOS installed, but with a tailored "install" file that simply instructs the user on how to install DOS version 1.1. In addition, an autoexec.bat



file is included.

Because my Sony television image is off-center to the left, and because I have both monochrome and television hooked up to the system unit at the same time, I copied the mode file from DOS and the new switch file from the February issue of Softalk onto the Novatron disk. When I then tried to run the program, the message "error in EXE file" appeared. I could not determine the source of the problem and called Verisoft.

Verisoft's literature specifies that the program is copy-protected and that backup copies may be purchased for \$7. However, the company's limited warranty states that if the program "fails to perform as Verisoft Words defines it should," it will fix the problem if they determine that there is a defect.

When I explained my procedures to the Verisoft representative over the

phone, he stated that programmers build things into the program that make it glitch when other material is copied onto the program disk, that the resulting error in the program file was caused by my action, that Verisoft is not therefore responsible, and that I would have to send them \$7 for a backup disk.

Verisoft was wrong in not warning about the problem in its literature. If I had been trying to make a copy of the program, its reaction would perhaps be understandable; however, I was not. I was merely attempting to make the program more usable.

Henceforth, I am only going to buy programs that are not copy-protected.

Joseph E. Russell
San Francisco, California

WP: A Mild Objection

Was there any point to the infantile whimperings committed by Clifford Barney ("User-Friendly Word Processors") in Volume 1 Number 7? If so, it eluded me—and Barney as well, I suspect.

I notice that Barney was unable to specify either (a) an example of his proposed standard, or (b) where, and to whom, the economic benefit—the key to standardization—would accrue. Barney's hysterics are typical of the kind of nonsense perpetrated by those with limited experience in either programming or business.

He noted, for example, that "the best word processors have been designed for newspapers." It is true that firms such as Atex have had great success designing systems and keyboards for that notoriously technophobic group, journalists. However, he should investigate the cost differential of that product before holding it up as a paragon of good design.

Barney might give some thought to two subjects: the relationships between

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M-Over/Understock
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O-Physical Inv.

Highlights

F-Find & Display
G-Bar Charts
H-Report Generate
I-Directions OFF
J-Demo Data OFF

System Functions

P-Change Password
Q-Set Soft Keys
R-File Backups
S-Assign Files
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Letters To PC

enormous flexibility of a tool and the burden that flexibility places on the tools user, and the standard-setting and enforcing process.

Howard A. Karten
Randolph, Massachusetts

Clifford Barney replies:

If not actually technophobic, writers and artists have always been notoriously indifferent to the costs of technology. I am sorry I offended Mr. Karten, but I think that someday it will benefit someone economically to design a really good word processor for microcomputers. In the meantime, I hope I may be forgiven for poking some fun at the clumsy word processors we presently have.

Attention SuperCalc Users

In your Volume 1 Number 9 "Letters to PC" column, a reader asked the question, "Is there a newsletter devoted to the SuperCalc program?" The answer is yes.

It's SuperNews, the newsletter published quarterly by Sorcim Corporation, makers of the SuperCalc program. It contains helpful and easy to understand tips and answers to questions people have regarding SuperCalc.

We send it free to all registered users of our software products. People who have not sent in their registration cards should send their name, address, phone number, serial number from the disk, and proof of purchase to Sorcim Corporation at 2310 Lundy Avenue, San Jose, California 95131. We'll put them on our mailing list for SuperNews.

Thanks for letting people know it's available.

Barbara L. Feinberg
Editor, SuperNews
San Jose, California

Free Offer

I read with interest your articles on communications (Volume 1 Number 9)

and the software packages available for the PC to make it act like a terminal. I have been offering, free, a terminal simulator especially designed for interfacing with UNIX systems.

The package is written in Pascal and Macro, and requires version 1.0 of the Asynchronous Communications software from IBM. It supports full screen (via "termcap" entries), with the ability to upload/download text files and output to the printer.

Also included are interfaces for Pascal to control the screen and a set of macros to do "if-then-else," "repeat-until," and "do-while" constructs in assembly language. The program handles 1200 baud with no characters being delayed in the buffer.

I will gladly distribute this package to any of your readers. They must send a floppy disk and a self-addressed, stamped envelope to 35 Dogwood Trail, Randolph, New Jersey 07869.

Jim Holtzman
Randolph, New Jersey

Volkswriter Bugs Him

I recently purchased the Volkswriter word processor, and I have found, in the 64K version, some bugs that showed up when the length of my output was two pages.

The Print option has a terrible defect!

This defect does not show up as long as you alternately edit the file and print it. What you cannot do is print the same file more than once without performing some other function between the Print commands.

I tried various ways of getting around this problem without success. First I tried using another file, which was a list of Print commands, to print the same file name. Only one copy was printed. Next, instead of printing a file from the disk, I tried the N option, which prints the file being edited. In this way I could print the file more than once, but each

time six lines were deleted from the beginning.

I called Lifetree Associates in California about the problem and received several suggestions (try this, try that), none of which worked. Then, because Volkswriter uses standard DOS format for the files, I wrote a routine in BASIC to print multiple copies. However, a word processor program should be able to print a file more than once!

All in all, I'm not too happy with the Volkswriter program.

Edward Madory
Poughkeepsie, New York

Games Gaffe

In the article on games (Volume 1 Number 8), the table of games has a shaded portion with double asterisks, but their meaning isn't explained. It is left to the reader to figure out that those are the games reviewed in detail later on. A footnote would be very helpful.

Jack C. Lee
Hyde Park, New York

The shaded portion does indicate the games we reviewed. The footnote was omitted inadvertently.—Ed.

A Toggle Tale

The IBM Asynchronous Communications Support, version 1.0, requires 64K, not 32K as George D. Hughes, Jr. states in his review (Volume 1 Number 9). He also fails to mention that this program actually consists of two programs: a BASIC superstructure, and an assembly language base program that provides the interface with the communications adapter. The assembly base program provides a 128 character transmit buffer and a 2K receiver buffer, and runs very fast.

With a few minor modifications to the BASIC program, I can toggle my printer on and off at will, easily call auto log-on sequences and phone numbers from the disk, and upload from and

Letters To PC

download to disk. Note that the COMM.BAS program provided on the PC-DOS disk, written totally in BASIC, can just barely keep up with 300-baud transmission, and adding a printer output step to this program will result in some XOFF/XON activity.

Contrary to what is indicated in the PC "Guide to Operations," the Scroll Lock key is not an inactive key. At absolute address, 417H is a byte indicating the status of several keys on the keyboard:

Bit #	Function:
0	- when set indicates Right shift key pressed.
1	- when set indicates Left shift key pressed.
2	- when set indicates Ctrl key pressed.
3	- when set indicates Alt key pressed.
4	- this bit is toggled set or reset by pressing the Scroll Lock key!
5	- this bit is toggled by the Num Lock key.
6	- toggled by the Caps Lock key.
7	- toggled by the Ins key.

Although the Scroll Lock key is not commonly used except in conjunction with the Ctrl key, there is no technical reason why it can't be used by your application.

Jefferey Sutherland
Hammond, LA

Tacky, Tacky

Upon reading the first few pages of "CP/M-86 and MS-DOS: a Comparative Analysis" (Volume 1 Number 7), I thought the article was unjustifiably biased, with insufficient explanation of the author's preference of CP/M-86. At the end of the article, I learned that the author is employed by Digital Research.

I later noticed the article, "Concurrent CP/M-86" in Volume 1 Number 6. After reading first the superlative eye-catchers in bold print and then the first column, I started to wonder who the au-

thor was. However, no description or background was given.

I looked up the article in Volume 1 Number 7 and found that both articles had the same author! He is also the author of the CP/M-86 manual, and Volume 1 Number 6 doesn't mention this. I consider this extremely tacky, and it destroys PC's credibility.

Brian Sharpe
Ft. Collins, Colorado

We agree. The kind of conflict of interest you describe was an occasional practice of the past, and one we have discontinued. We will, though, go to the experts for stories about trends and products not directly related to their own companies.—Ed.

Wish Fulfillment

In the Wish List in Volume 1 Number 9, Stephen Van Gordon of Campbell, California asked for a user-friendly program for auctioneers. That we have. It uses 20 single stroke commands with menus for consignments, pre-sale (re-listing, cataloging, etc.), selling, and revenue procedures. The Auctioneer really gives the PC a work-out. It's an action-packed program for a fast-moving business.

For more information, write to Frontier Computer Systems, 4463 Lougheed Highway, Burnaby, British Columbia V5C 3Z2 Canada.

Norman Fowler
Frontier Computer Systems
Calgary, Alberta

Thanks for the information. If anyone else can fulfill a Wish List request, we'll be happy to pass the news along to our readers.—Ed.

In Volume 1 Number 8, the Wish List contained a request for a graphics card allowing algebraic equations including super-subscripts to be displayed on a Hi-Res RGB monitor. It just so happens that I have been working on the problem for

the past 8 months, and expect to complete a Scientific Symbol Editor with that capability soon.

It doesn't require a special graphics card, but does require 256K of memory and (currently) an IDS Prism or Microprism with additional character set chips. For more information, write to me at Queens University, Department of Mathematics and Statistics, Kingston, Ontario K7L 3N6 Canada.

I have a request for PC. I read the magazine primarily for the advertisements and product reviews. Magazines are the only way to find out about products for sale for the PC. Your magazine has grown to such a size that it is difficult for me to quickly find information about the sort of products I am interested in. I request that PC implement an extended Index to Advertisers, including listings by product name and by category as well as by company name (as you do currently).

I'll look forward to easier access to information in future issues of PC.

Lee-Jeff Bell
Kingston, Canada

Star Struck

I'm writing this by hand because my copy of WordStar is not functioning; I'm writing to you because you've had articles about WordStar in your last few issues.

To get an update of WordStar, I had to turn in my distribution copy of the program and then wait from December 14 to February 16 to get the update—which won't print. It sends my IBM PC into a complete lock-up that requires a reboot to escape from. Now I have to return the update to the dealer.

What does the update do? It's supposed to run under DOS 1.1, but it still has the same limited printer install program and no terminal install program. Therefore, the help leads, justification toggles, etc. must be reset from the default values. The documentation talks

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Letters To PC

about installing WordStar under DOS-86, where the defaults can be changed, and the documentation gives a listing that can be used with a micro assembly program. Real helpful to the non-hacker who wants a convenient word-processing package.

The update features a more ominous copyright notice, and the same old junk such as using Function key 9 for end of file and 10 for beginning of file. At least the new documentation shows which key does what; the old documentation had the functions for those keys reversed.

Sorry for the crossouts and misspellings. I tried to get SpellStar to read this, but no luck.

Tony Poze
Cambridge, Massachusetts

The PC Goes to Camp

I'm really intrigued by the computer camp article by Barbara Harvie (Volume 1 Number 8). Can you suggest some camps for the coming summer, specifically for PC users? I have several friends interested in such camps for their children.

Gary Rickards
Kansas City, Missouri

When "Computer Camps" was being researched, the PC was so new that few computer camps, if any, were devoted to it. Now, Barbara Harvie tells us that CompuCamp, a chain with nine computer camps across the country, has introduced the PC into its curriculum. For more information, write to CompuCamp, 5764 Paradise Drive, #7, Corte Madera, California 94925.—Ed.

Chess Challenge

Whatever became of the game of chess? After finally receiving my copy of PC Volume 1 Number 8 on the 26th of December, I can truly say it was the first issue I was disappointed in. An entire is-

sue devoted primarily to games, and not one chess program reviewed! I can't believe there are no chess programs adapted for the PC—or am I wrong?

However, overall I am very pleased with PC, and it was a major factor in my choosing the IBM as my home computer.

Harvey J. Nelson
Tucson, Arizona

Please don't shoot the messenger! We were looking for a chess game for the PC to include, but there were none available at the time. We have since located one, and we will run a review in an upcoming issue—Ed.

EasyWriter: Pro . . .

Does your staff have something against EasyWriter II? I notice that it is never mentioned in your reviews of word processors, while WordStar is discussed constantly. EasyWriter wasn't even mentioned in your feature on word processing programs (Volume 1 Number 7) and I can see no reason, other than prejudice, to omit such a popular and widely-used program from an omnibus review. Before I bought EasyWriter I tried out WordStar and found it much less "friendly."

Paul Segal
Syracuse, New York

No, we haven't ignored EasyWriter II. You can look for a review in an upcoming issue. That product—which has already developed its own devoted following—came out too late to be included in our word processing issue.—Ed.

. . . And Con

IBM doesn't make many mistakes, but when it does, they are humdingers. Here's the latest on the EasyWriter fiasco.

Fortunately, I missed all the EasyWriter 1.0 troubles. Version 1.1 almost convinced me that 1.0 had gotten a bum rap. Then I bought ProofReader and, as

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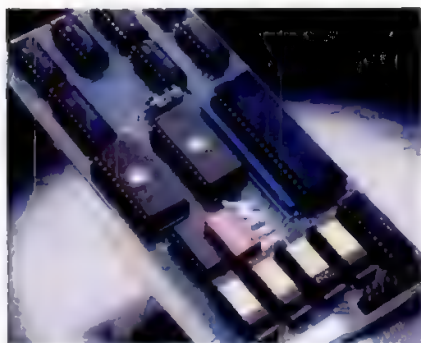
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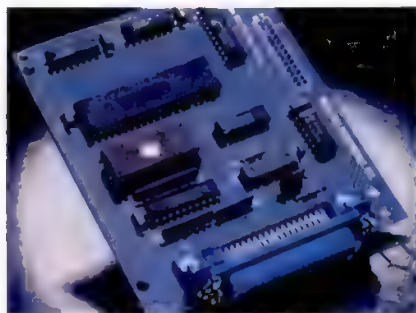
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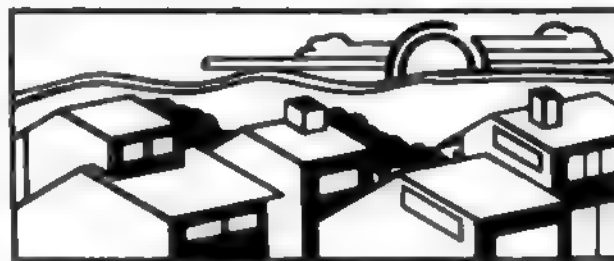
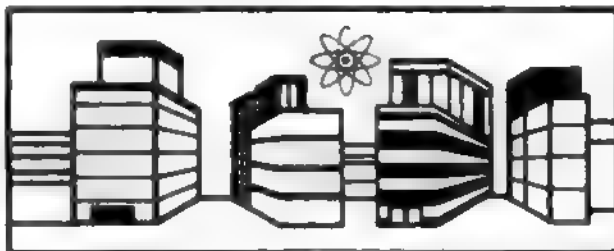
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Letters To PC

Aspen sensibly recommends, tried to add it to my EasyWriter 1.1 program disk. There's plenty of room for both on my 320K drives, and, as recommended in IBM's EasyWriter manual, I'd carefully formatted my only permitted copy to 320K.

Surprise! My copy has only 160K. Why? Although it may be totally unnecessary and uncalled for, EasyWriter 1.1's backup.bat reformats the disk with a "format b:s/1"—forcing it to become a single-sided 160K disk.

There's not enough room for both in 160K. Surely the constant shuttling of the two disks will quickly wear out my one permitted copy of EasyWriter 1.1. (ProofReader sensibly permits copies; all I'll be out when it's destroyed is the cost of a disk.)

IBM usually fixes its blunders, but when I took this one to my local ComputerLand, IBM's dealer hotline told it, "No way."

Somewhere in IBM there must be someone who can see the justice of swapping my two fouled-up copies of EasyWriter 1.1 for copies that permit use of my full 320K.

Charles R. Blair, Sr.
Townsend, Tennessee

A Call for Help

In "Speak To Me, PC!" (Volume 1 Number 8) Frank Derfler refers to Votrax Type 'N Talk, which he says is reviewed in that issue. Help! I can't find the review. Please send directions.

Karen Haddad
Birmingham, Michigan

See "In the Beginning, The Word" by Dr. Larry Press in Volume 1 Number 9.—Ed.

Calling All Modems

I am disappointed that your magazine chose not to review modems that are optimized for the PC. Generalized smart modem articles are a dime a dozen.

When I subscribed to PC, I was hoping to get reviews of hardware and software that are optimized for the IBM PC.

There are at least two companies advertising bus-connected modems in your pages at prices that are competitive with the outboard-mounted modems. Will you please review those in a future issue? I am also tired of articles that are merely a discussion of product features. How about some more evaluation of those products?

James E. Stacy
Syracuse, New York

PC runs both articles that are product descriptions and product reviews or evaluations, depending upon the number of similar products available and their complexity. As to your specific question about modems that mount outside the PC, you can expect reviews of those newer products in an upcoming issue.

And, by the way, see the editor's call for reviewers with specific areas of expertise at the end of the letters section.—Ed.

Correction

The correct address for the New York Amateur Computer Club ("Club News", Volume 1 Number 10, page 360) is P.O. Box 106, Church Street Station, New York, New York 10008.

Readers . . .

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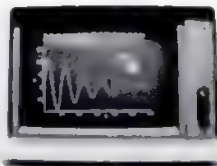
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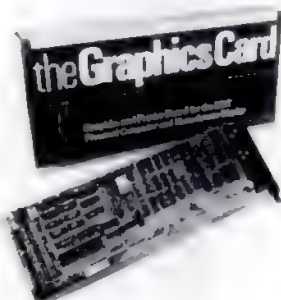
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A Modest Proposal

Many thanks for the service you continue to perform. "Letters to PC" is why I am a committed reader. I have a suggestion that, although it may mean temporary losses, would eventually guarantee even more readers, as well as more customers for the products advertised in PC.

Devote a section to a buyer's report or market report card. This would alleviate initial reservations about buying over the phone, as well as the frustration of unsatisfactory sales transactions. There might be several categories of evaluation. This would help improve the efficiency of every serious merchandiser.

John R. Schmidt
Cincinnati, Ohio

It's a wonderful idea, but we thought of it first. Coming soon. . . —Ed.

Back and FORTH

In Michael Ham's article, "Quest for the Ideal Language" (Volume 1 Number 10), he remarks, "Some will say FORTH's names for the elemental operations are terse if not arbitrary. True, I can't defend @ for store and ! for fetch." Ham is quite correct. He cannot defend this, especially since @ represents fetch and ! represents store!

Paul A. Fishwick
Newport News, Virginia

You are absolutely correct, according to editor Stan Veit.—Ed.

User Group Listings

I'm looking into computer clubs in my area, and I heard that PC Volume 1 Number 10 listed such clubs. Could you send me a copy? I'd appreciate it.

Paul F. Gunberg
Augusta, New Jersey

We receive many letters requesting copies of our User Group list. An updated list appears in this month's Club News column, and we'll be updating and printing the list periodically.—Ed.

Just the Beginning

While reading PC-Communicues in Volume 1 Number 9, I encountered an entry questioning how long it would be before IBM allows a PC to participate in a dis-

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Letters To PC

tributed processing network, switching between PC mode and CICS, IMS, TSO, etc.

Funny you should mention this. Earlier on that same day, I was given a presentation by IBM demonstrating this capability. A PC was connected (via a Twinax interface) to an IBM 5520 text processing machine, which was in turn communicating with an IBM mainframe. The PC could run stand-alone, or act as a terminal to the 5520, or run as a 3278 CRT to the mainframe with the 5520 performing a passthrough function.

Certain vendors, such as AST Research and American Business Machines, are currently offering 3270 emulation in either Bisync or SDLC modes, thereby providing similar capabilities.

All indications are that this is only the beginning. Soon there will be a plethora of interfaces for the PC to support attachment to systems up and down the IBM product line.

Ron Halyshtyn
Washington, D.C.

IBM announced just such an adaptation to the 3278 in March. See "Making The Connection-Data Processing With The PC" in this issue.—Ed.

Voice Synthesis: Second Thoughts

In response to "In The Beginning: The Word" (Volume 1 Number 9), by Dr. Larry Press, several points are in need of clarification and expansion.

It is true that voice interactive technology is playing an increasing role in our daily lives. Applications of voice synthesis systems for the handicapped, in aircraft cockpits, and in telecommunications are of value from a user, system performance, and cost perspective. On the other hand, applications of voice synthesis in automobiles, vending machines, cash registers, and household appliances are of questionable value and a product of industry's need to always

provide the latest gimmick to enamor more customers.

Dr. Press paints an unnecessarily bleak picture of voice recognition technology as it currently exists. Though his final statement that "the user will be able to sit down and hold an intelligent conversation with a personal computer" is overly optimistic, successful application of voice recognizers is currently being made.

For example, the postal service and several airlines are using voice recognizers for baggage and parcel sorting. In addition, the use of voice recognizers for the handicapped is being explored at research centers such as Stanford University. NASA, the Air Force, and the Navy are currently testing voice recognizers in laboratory settings and also in such high noise environments as helicopters and high performance jet aircraft with some success.

Voice recognition technology will continue to improve, but current recognizers, especially of the isolated word-speaker-dependent kind can be successfully used given that the system designer carefully selects the vocabulary and dialogue to maximize recognizer performance. PC owners wishing to consider voice recognizers should examine those manufactured by VOTAN (Fremont, California), Interstate Electronics (Anaheim, California), and Scott Instruments (Denton, Texas), to name a few.

Research to help us decide how to interact with our increasingly common computer-based systems is under way. Misapplying new technologies by rushing to include them in every conceivable system can only serve to alienate the users of those systems and make the acceptance of the new technologies more difficult when appropriate applications are found.

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How to get your fin

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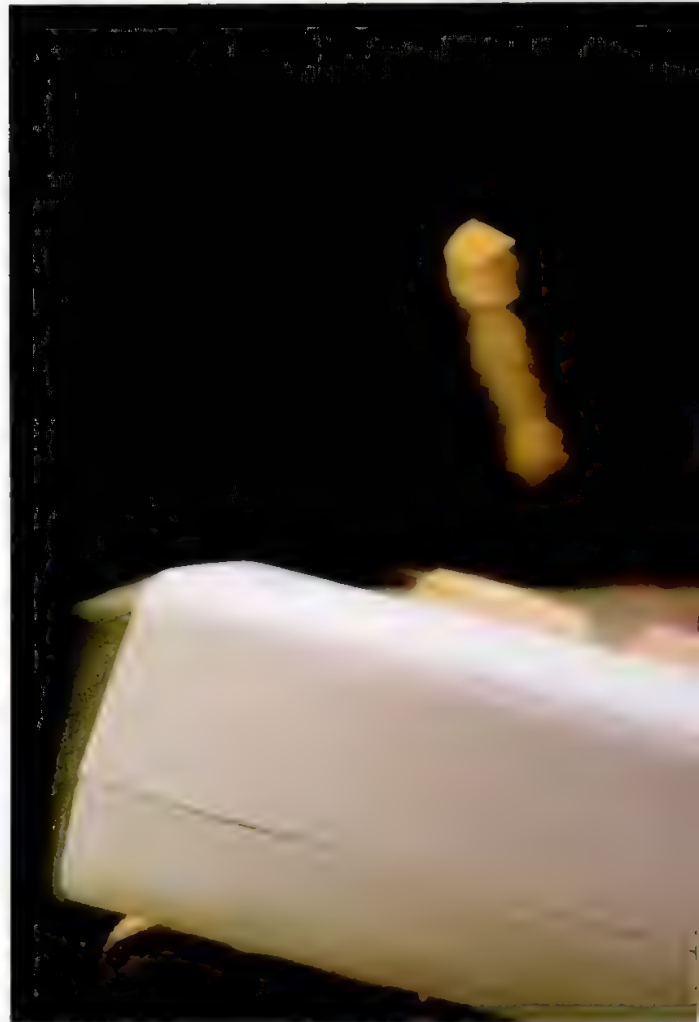
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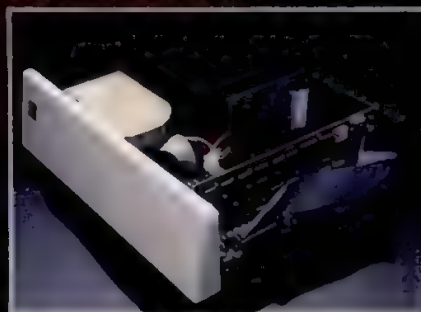
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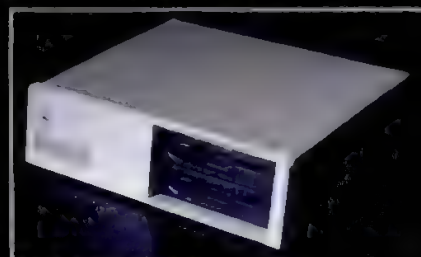
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PC-Communiques

A compendium of facts, news, opinions, gossip, inside intelligence speculation, and forecasts about IBM Personal Computers.

Busy Bootin'?

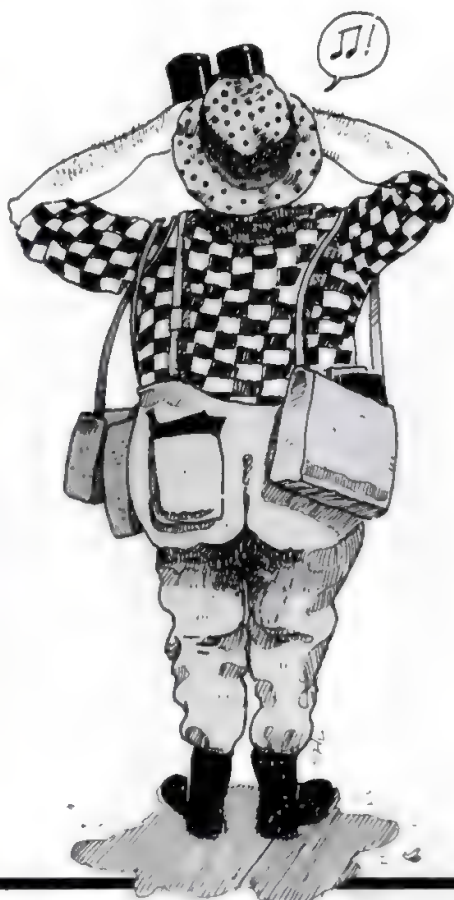
Is your paramour playing second fiddle to your PC? Bluesman Kokomo Arnold apparently experienced the problem firsthand. He even wrote a song about it, in which he minces no words:

Busy bootin' and you can't come in,
Busy bootin' and you can't come in.
Busy bootin' and you can't come in—
Come back tomorrow night and try it again.

Arnold admits his attitude can lead to violence: Don't you remember last Friday night? You got out in the street and you wanted to fight. But he remains unrepentant about his attachment to his machine. "I'm busy bootin'! Can't come in!" he cries as the music fades down.

Contributing Editor Steve Manes points out that Arnold's tune is particularly prophetic since it dates from 1935, when the only available digital computers were the ones that remain most popular worldwide—the five fingers of each hand.

Arnold's dexterity with those fingers on bottleneck guitar can be heard on LP *Kokomo Arnold & Casey Bill Weldon*, \$8.95 from Yazoo Records, 245 Waverly Place, New York 10014. The record—Yazoo 1049—includes "Busy Bootin'" along with 13 other selections from the thirties, including Arnold's prescient ode to the IBM keyboard, "Feels So Good," and Weldon's instructive ditty about running a monochrome display from the color/graphics adapter, "You Shouldn't Do That."



Fieldguides to PC Software

More releases from MicroInformation Publishing (MIP): The Minneapolis-based book house has announced three new issues about software for the IBM PC.

The *IBM Software Guide and Handbook* will list over 160 programs. Programs are organized by 65 categories and have been rated on a 1 to 100 scale by 30 researchers. These ratings are based on such factors as ease of use, reliability, error trapping, documentation, and cost effectiveness. The book will retail for \$19.95.

MIP's other two books are spinoffs from the above volume. The *Business Guide To The IBM PC and Word Processing Software For The IBM PC* will sell for \$14.95 each. The publisher can be contacted at (612) 447-6959.

Can You Keep a Secret?

How much secrecy about a new product is too much? IBM may have found out recently—especially if anyone at Big Blue noticed an advertisement that Datel, the New York computer emporium, placed in the New York Times last month.

Nearly a week after the PC-XT was announced to the public, and more than a week after IBM dealers found out about it, the Times ran a Datel ad heralding the arrival of "the second IBM personal computer." Above this caption was an illustration showing an eager audience watching a PC-like monitor suspended before them.

According to the copy, "few sequels live up to the original version." But the second Generation Personal Computer is, "impossible as it may sound, better than the original. More memory, more power, and an optional monitor that displays in living color." It concluded, "... hurry down to your nearest Datel store. Popcorn will be served."

It seems clear that the ad was composed before the announcement of the XT, in the days when the microcomputer world knew only that something was afoot at IBM. Datel, perhaps trying to get a headstart but unable to penetrate IBM's veil of secrecy, took a gamble. Only a small gamble, though—the ad was phrased so vaguely that Datel couldn't fall flat on its face even if it was wrong about Popcorn.

Our calls to Datel elicited no further information, but it may be indicative of the ensuing confusion that one employee called the new model the "PC Personal."

PC-Communiques

"THOSE OF YOU WHO HAVE worked with IBM personal computers will notice that they look remarkably alike. . . . The XT represents a significant extension of the performance range and storage capacity of IBM's personal computer line."

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Growth Projections

Just about everyone knows that the microcomputer industry is expanding like an exploding star. And most observers assume that the activity will level off or at least become more concentrated in the next few years as hardware and software manufacturers "shakeout" of the industry. But until recently, there's been little quantitative data to support widely held assumptions.

In March, Arthur D. Little, Inc., the international research and management consulting firm, released results of its survey of the microcomputer market. The company counted 150 manufacturers "scrambling" for a piece of the \$3.5 billion market.

It predicted that annual sales would increase to \$12-15 billion in 5 years.

Currently, microcomputers account for 8 percent of the \$45 billion spent in 1982 in the U.S. on all computer-based products, including software. Arthur D. Little estimates that by 1987, the microcomputer share of the total market will grow to 12 percent.

Meanwhile, Future Computing, a consulting firm, reported that market share for the IBM PC (as measured by factory value) grew more than tenfold from 1.9 percent in 1981 to 21 percent projected for 1983. Over the same period, Radio Shack's shared slipped from 20 to 16 percent; Apple's slice was cut from 17 to 13 percent; and a company named "Other" dropped from 61 to 50 percent.

The Serial Boxes

For those of you who are playing the great IBM PC serial number sweepstakes, here are some new entries:

The PC-XT unveiled to the press on March 8 in New York City bore serial number 00003516.

The new 5153 color monitor for the PC bore serial number 002071. We're off and counting.

Good News, Bad News

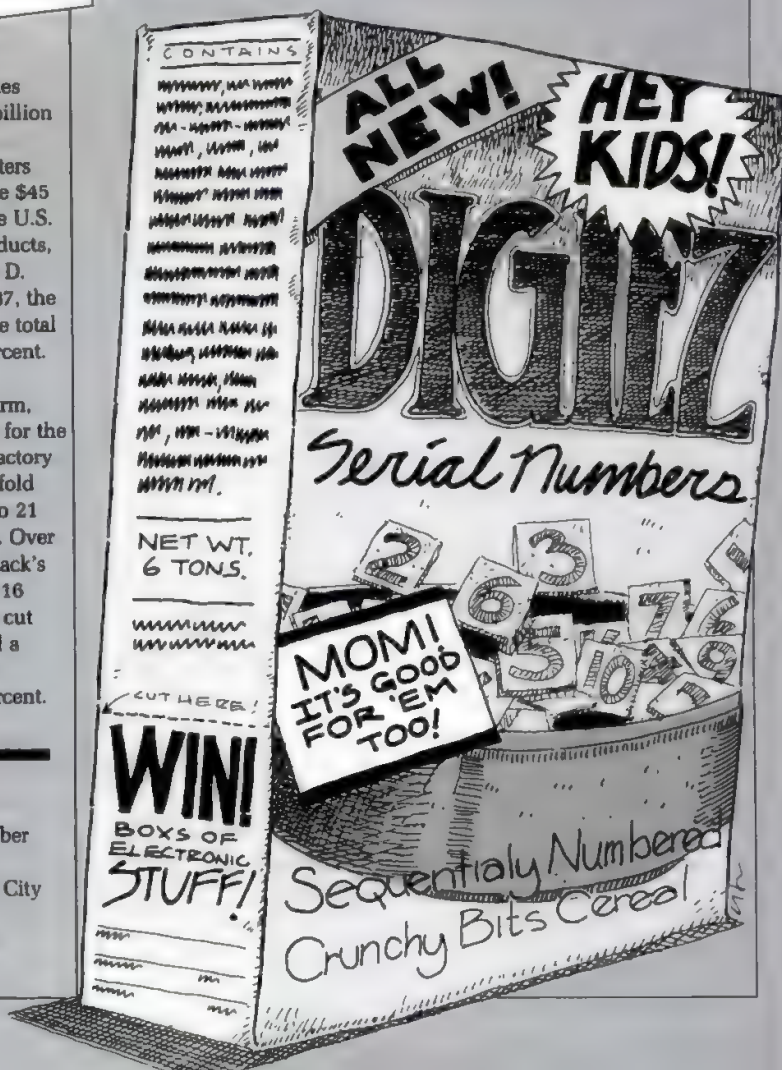
The New York Amateur Computing Club (NYACC) announced that 20 volumes in its series of "freeware" are available for the IBM PC.

Until now, this mass of public domain software had only been available from CP/M user group libraries. They were originally designed to run on 8-bit microprocessors.

No longer. The new series of disks offers programs designed to run under PC DOS, including programs written in BASIC. They will now run on IBM PCs, but—the bad news—only on those machines equipped with an add-on board from the 8080 or Z80 family.

The last catch renders freeware far from cheap for most PC users. Add-on boards, such as Baby Blue, can cost several hundred dollars.

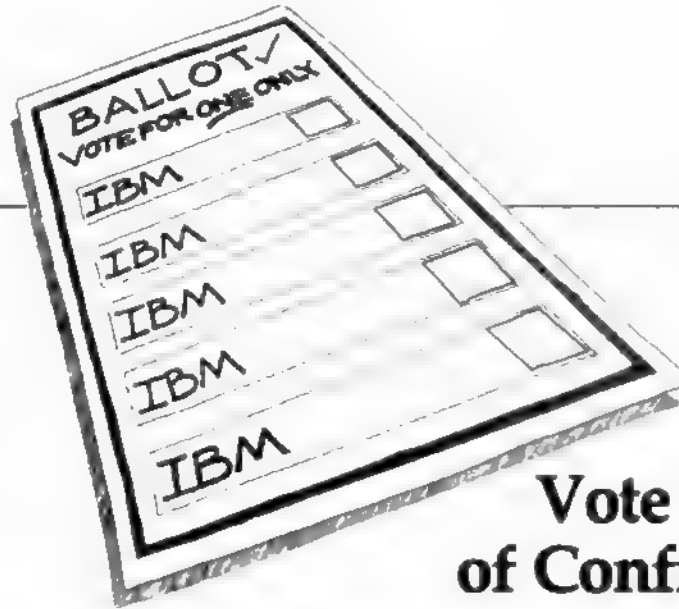
Recycled programs such as these are not likely to use many of the IBM machine's capabilities—if they're able to run at all.



Silicon Alley

During the press conference in New York at which IBM announced the new PC-XT, a company representative flashed an example of a color graphics chart on a large color video screen. (The oversized screen, by the way, was made by a well-known Japanese electronics firm whose name begins with SO and ends with NY.)

While the demonstrator went on talking, our sharp-eyed reporter in the front row read the copy on the display, "Boca Lanes Bowling Scores," said Carl Lunden bowled a 211, Jed Perlowin a 210, and D.C. Thorson and Jerry Heald each toted up a score of 202. Who are these gentlemen? We're told they're programmers and technicians at IBM Boca Raton. And you thought all those IBM folk thought about were ROMs, RAMs and EPROMs!



Vote of Confidence

A Boston-area IBM PC user group conducted a poll of its members in February. IBM should be happy to hear that of the club's 800 members, only 12 had ever experienced hardware problems with their PCs. Few things in life have a batting average of 985.

Can VDTs Make You Sterile?

Over the past year, a debate has raged over the issue of reproductive problems that may be caused by exposure to the video display terminals (VDTs) used on computers. This health issue has become less esoteric as more and more people spend much of their day around computers, at work and at home.

Martha Zybko, associate editor of *Microwave News* (a monthly report on the field of non-ionizing radiation), pointed out that the National Institute of

Occupational Safety and Health (NIOSH) assures that there is no danger from exposure to VDTs. At the same time, NIOSH plans to launch a retrospective study on over 5,000 office workers. The study will focus on the effects, if any, of VDTs on reproduction.

Microwave News recently

published an 86-page collection called "Video Display Terminals: Health and Safety," containing excerpts of articles on this subject. In addition to the reproduction question, this pamphlet addresses other ergonomic issues raised by the growing number of employees who spend most of their workdays hunched over terminals.

To obtain the pamphlet, send \$5.95 (plus \$1 for postage) to *Microwave News*, P.O. Box 1799, Grand Central Station, New York, NY 10163.



Make Mine Pepperoni

Just when you thought there was enough data in the world, somebody found a new question to ask.

Kamstra Communications, a St. Paul, Minnesota advertising firm, conducted a survey at last year's Applefest in Minneapolis. The typical user-on-the-street was asked a series of questions about personal computers—typical market survey material.

The final question, however, was not so predictable: What type of pizza do you crave?

Kamstra's experts were baffled by a powerful trend in the answers to this question—75 percent of IBM PC users proved to have a passion for pepperoni pizza. Less than half of the Apple owners shared that taste.

Marketing Research Director Dan Burke interpreted these results and offered the following recommendations. "Either IBM computer salespeople should seek out pepperoni lovers as potential clients. Or pizza parlors could exploit a vast, untapped market for pepperoni pizza by luring IBM computer users within sniffing distance of their product."

PC-Communique

The Call of the Mild

Too delicate to rough it at computer camp? How about a PC resort?

The Jackson Hole Personal Computer Resort, a 4-star complex in Jackson Hole, Wyoming, offers guests 4 hours daily of classroom computer instruction plus 2 hours of hands-on lab time during the introductory 3-day course.

This leaves only 18 hours a day for tennis, racketball, fishing, and golf, not to mention eating and sleeping. Most guests will probably need to stay on for the follow-up two day extension, which includes BASIC, electronic spreadsheets, horse back riding, skiing, swimming. . . . For more information, call (800) 443-8616

Citric Intelligence

Along with IBM PCs and vacation suntans, the state of Florida produces much of this country's citrus fruit and sugar cane. As a friendly gesture to its neighboring industries, IBM has loaned seven PCs to the University of Florida's Institute of Food and Agricultural Sciences in Gainesville.

IBM also has sponsored a \$100,000 grant to be used over the next two and one-half years. The fund will be applied toward development of software to assist in the production of Florida's specialty crops and to teach budding agricultural students how to use the PC in their work.

The agricultural department has also organized a series of traveling computer shows for Florida's farming regions. These shows demonstrate how microcomputers can be used productively down on the farm.

"The IBM PC always attracts the biggest crowd at these shows," according to a university spokesman. This rural interest in the PC is a bit surprising because, at present, much more agricultural software has been harvested for the Apple and Radio Shack computers. Programs dedicated to counting corn rows and analysing cow-to-calf ratios are just starting to come to market for the IBM PC.

IBM has a major stake in luring Florida's present and future farmers. A recent study by the University of Illinois and the Arthur Anderson Company predicted that 75 percent of large commercial farms (those with revenues of at least \$100,000 per year) will be using microcomputers by 1993. These figures will translate into lots of dollars for the company that can best rope and hog-tie this market.

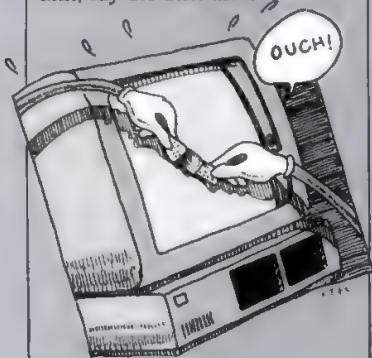
A Tramp Abroad

Before IBM could unleash its PC advertising blitz based around Charlie Chaplin the rights to the little tramp had to be cleared through Chaplin's estate. Its offices are based in Switzerland under the name of Bubbles, Ltd. IBM now holds exclusive, long-term rights to use the little man with the bowler hat—but only for computer-related promotions.

First Aid for the PC

Soon there may be a new way to avoid waiting while your PC is shipped to and from a repair center when it's on the fritz. IBM is considering a system that would enable users to diagnose malfunctions and replace parts themselves.

The "Machine Element Replacement Program," as it is provisionally named, would allow you to isolate an improper unit, say the disk drive



controller, and perform a diagnostic check. If necessary, you would remove the faulty unit, take it to a repair center for replacement, and come home to install the unit yourself.

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Revving Up RAM-disk



Coaxing Out Characters

Q: I use WordStar on my PC with an NEC Spinwriter printer equipped with a multilingual thimble. I am unable to print the additional characters (beyond the standard 94 that are on the keyboard). Neither the IBM PC nor the WordStar manuals seems to offer any help. Can you give me a non-technical explanation of how to go about printing these characters?

James L. Schaaf
Columbus, Ohio

A: Having had some experience with the NEC Spinwriter manual, I can understand your problem. The best answer I can give you will require some experimentation on your part. A method of changing the print attributes of WordStar was described in PC Magazine (Volume 1, Number 9, page 442). To access the special NEC characters, the addresses in the instructions must be modified for the NEC.

In particular, one suggestion might be to use USR1 and USR2 to switch between the two possible NEC fonts. If that is the case, then you would want to put the string 01 0F at USR1 to have WordStar send the printer a signal to shift in, and 01 0E at USR2 to have WordStar send a shift

out signal.

As in the above answer, the sequence of commands would be:

A>DEBUG B:WS.COM

-e77F 01 0F

-e784 01 0E

-w

Writing 5000 bytes

-q

A>

Make sure you have WordStar version 3.2. Other versions may have USR1 and USR2 in different memory locations.

At this point, to print a foreign character, just surround the character with Ctrl-Q and Ctrl-W (use Ctrl-P to embed the control characters). Look at the Help message for Ctrl-P to get a feel for how this goes, and refer to the earlier article in PC.

The NEC printer uses standard ASCII input characters. Whenever a shift-in or shift-out is received, the NEC starts to print a different set of characters, so to print an O with an Umlaut, either Ctrl-Q O Ctrl-W or Ctrl-W O Ctrl-Q may be required

in the text. This will take some experimentation, so try surrounding all the characters in the alphabet with Ctrl-Q and Ctrl-W to see what works and what doesn't.

Scientific Upgrade

Q: My company is about to purchase its first IBM PC, for use principally in scientific applications. As such, I included in the order an 8087 chip with some associated software.

I would like to know whether or not this upgrade package can actually deliver the performance of which the 8087 chip is intrinsically capable, as I know from direct contact with Intel.

John Weinberg

Northrop Electronics Division

A: I have been asked this question by a number of people. One sent benchmarks comparing single-precision multiply and divide routines performed in compiled BASIC without the 8087 versus an assembly language program using the 8087.

The timing comparisons presented in my column for PC Volume 1, Number 8 were directly from the Intel manual. As such, they compare the best possible cases for each combination of Intel chips. Thus,

all arithmetic was double-precision (be warned that IBM's FORTRAN is incapable of this precision), and all of the 8087 error checking was emulated in software.

The 8087 is a very powerful chip. It includes ways to detect roundoff errors, divide by zero, and overflow, all following IEEE standards. Very often, floating point routines in commercial software will not take advantage of all of the nice abilities of the 8087. This means that speed savings will be somewhat less than those indicated by Intel's timings. Furthermore, a fair amount of the time spent processing a program is for overhead; there are disk read routines, questions and answers, and probably a lot of loops that use integers.

Expect that a completed program with a fair amount of floating point will have a speed increase of no more than perhaps 10-to-1 when using the 8087. The more double-precision number crunching there is in a program, the better the speed improvement. This is particularly noticeable with routines that involve square roots and logarithms.

This rule of thumb is far more conservative than the speed increases displayed in the benchmarks that Intel announced. Intel's software engineers are so knowledgeable about their products that they are wizards at using them to produce amazing benchmarks.

A COMPLETED program with a fair amount of floating point will have a speed increase of no more than perhaps 10-to-1 when using the 8087.

Colored Words

Q: Is there any way to get WordStar or VisiCalc to display in color? It would certainly be nice to get a green on black display, instead of the usual white on black.

Thomas Koziol
Deer Park, New York

A: It is nearly impossible to coerce VisiCalc into doing anything. WordStar is another matter.

If you do this carefully, the following approach should work. This was done with WordStar version 3.20. Other versions of WordStar may very well locate the data bytes at other addresses.

The following sequence of commands will change low intensity to high and vice versa. The data bytes only define the character attributes used by WordStar when displaying. (See page 2-50 of the IBM Technical Reference Manual for more documentation on attribute bytes.)

Input the underlined characters with the WordStar disk in drive B: and the DOS disk in drive A:.

A>DEBUG B:WS.COM

-e284

04EA:0284 07.0F

-e28B

04EA:028B 0F.07

-w

Writing 5000 bytes

-q

A>

Note that due to differences in number of drives and serial adapters, your DEBUG may not begin at segment 04EA. Don't worry about that. If your version of WS.COM does not begin with a 07 at location 284, then try to find the sequence 07 00 00 00 00 00 0F by using the "s" command. Make sure you do this with a copy of WS.COM, rather than the original disk, since you may make a fatal mistake.

The 0F you enter into the first memory location means that what was displayed as low intensity white (attribute 07) becomes high intensity white (attribute 0F). Similarly, what was high intensity becomes low intensity, thanks to the second entry you execute.

To turn high intensity white into green, for example, enter a 0C (high intensity green) into the second memory location; you won't have to perform the first entry.

Stuttering Keystrokes

Q: My WordStar has developed a problem that peeves me greatly. The space bar, even if depressed ever so briefly, now produces two spaces instead of one in about five percent of all cases. This occurs fully at random, without any pattern.

Since WordStar performed reliably for quite a while, I wonder what is the cause of this sudden deterioration? What can be done to remedy the situation?

H. D. Laun

Mill Neck, New York

A: It sounds as if the culprit here is not WordStar, but the PC's keyboard. Try plugging in another keyboard and see if

PHYSICALLY,
the keyboard is not well
constructed.

that helps. If not, perhaps you are having static problems. A number of companies sell static mats (see "Out, Damned Spark!" in PC Volume 1, Number 11 for some sources.)

Another possibility may be that the keyboard is failing. Physically, the keyboard is not well constructed. Shocks can adversely affect its performance to the point where replacement is necessary.

Quite a few readers have complained about problems experienced when using the keyboard in conditions of very low humidity. As a last resort, try installing a humidifier. The keyboard is a capacitive device, which means that a key stroke is detected by circuitry that notes substantial increases in the gap between the keyboard base and a spring-controlled metal lever. The accuracy of this circuit can easily be adversely affected by excess static or changes in humidity.

Saving Graphics

Q: I have tried to use BSAVE and BLOAD for graphics work and have found that the display after BLOAD is not the same as the one saved with BSAVE. Instead it looks like half of the points on the screen are missing. Can you explain this?

Also, when I've turned on the computer, I have gotten a number of different error messages such as 01 301, 03 301, and 07 301. Are these documented anywhere?

R. Joel Rahn

Ste.-Foy, Quebec, Canada

A: The first problem you are having has to do with the way graphics are displayed by

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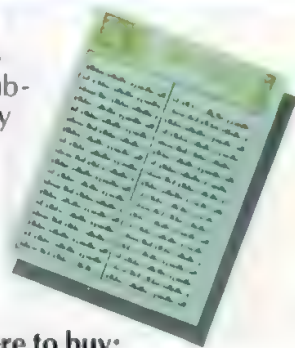
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the IBM color/graphics adapter. It uses different segments of memory for the even and the odd scan lines in a graphics display.

The top line of the display, line 0 (zero), begins at address B800:0000. (For an explanation of the hexadecimal format for address names, see my column in PC Volume 1, Number 9.) The next line on the display (line 1) begins at an address of B800:2000—that is 8192 higher in memory than line 0. Since line 0 requires 80 bytes for all of the dots (in high and medium resolution mode), the next even-numbered line, line 2, begins at address B800:0050. Line 3 begins at address B800:2050.

If you wish to save the whole screen, you can just BSAVE all 16K of display memory. If you want to save only the first ten scan lines, then you need to save five lines (or 400 bytes) beginning at B800:0000 (even lines 0 to 8), as well as five lines beginning at B800:2000 (odd lines 1 to 9). To redisplay the ten lines, just BLOAD both sets at their original addresses.

As for the error messages you have seen: some of them are partially documented in the problem determination section of the User's Guide. They are also documented in the source code in the Technical Reference Manual. For every-

one's convenience they are provided here in Figure 1.

Power Punishment

Q: I use my PC on an occasional basis. When I do use it, I might want to use it over a long period of time but only for three or four transactions.

What is the effect on the PC when it is left on for several hours, as opposed to turning it off and on only when I need to use it? How can I figure out how much electricity is used when the unit is on?

Dana Wylie

San Francisco, California

A: That is an extremely difficult question to answer. Whenever they are turned on and off, electrical components tend to experience a physical shock from the expansion/contraction cycle of heating and cooling. On the other hand, leaving the computer on will cause deterioration in the mechanical parts from wear, and in the electrical parts from sustained high temperatures.

My (not very scientific) guess would be that leaving the machine on for a few hours is better than turning it on and off repeatedly. If you leave the machine unattended for an hour or so, make sure you turn the brightness control on the monitor low enough that the screen appears blank. It is very easy to burn the phosphors on a

monitor when characters are displayed in the same place on the screen for an extended time period.

To determine how much power is consumed, the simplest approach would be to first turn off all of your electrical appliances, then check the reading on the electrical meter installed on your house by the

LEAIVING
*the computer on will
 cause deterioration in
 the electrical parts from
 sustained high
 temperatures.*

utility company. Once you make sure nothing is moving on the meter, turn on the PC and use it for a few hours. Go back and recheck the electrical meter to see how much power was used up during that time period.

Avoiding Double Occupancy

Q: I hope you can help me with a very sticky and troublesome technical problem.

I have a PC with 128K and a monochrome display. Some time ago I was toying with calling machine language subroutines from BASIC. Since I have more than 64K, I chose to load the subroutines in the uppermost 64K of my machine (beginning at DEF SEG = &h1000).

After having all sorts of bizarre and erratic results with this approach I began to suspect that BASIC was randomly clobbering storage in the uppermost 64K of my machine. Is this so? I thought BASIC only used 64K.

Larry Ellis

Wheeling, Illinois

A: In an earlier PC Tutor column (PC, Volume 1, Number 9) I discussed how the 8088 addresses via segments and offsets.

BASIC is restricted to a 64K code segment, but this segment does not need to start at location 0. In fact, BASIC begins at some arbitrary location determined by the size of DOS, how many drives you have,

Figure 1: Selected error messages with interpretations.

Hardware errors upon power-up

- Parity Check 1 - Serious memory error on system board
- Parity Check 2 - Serious memory error on add-on RAM
- 1 long/1 short beep - Miscellaneous hardware error (followed by halted system)
- 1 long/2 short beep - Display memory or timing error

Diagnostics

- xx yy 201 Add-on RAM memory error
 - xx = top byte of failed segment (e.g. xx = F5 => segment F500 failed)
 - yy = 0 if parity error
 - true bits => error in that bit (e.g. yy = 03 => bits 0 and 1 incorrect)
- xx 301 Keyboard error
 - xx = if blank, then invalid keyboard reset = scancode of stuck keys (see p. 2-17) (this may happen if you hold a key constantly during reset)
- 131 Cassette interface error
- 601 Diskette controller error

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and whether any communications buffers are selected.

BASIC will use up to 64K beyond that point in memory. If you wish to use a machine language program that is kept out of BASIC's reach, then I suggest you pick something beyond 96K since DOS and the buffers usually occupy well less than 32K. If you are writing commercial programs, then even 96K isn't enough leeway; some users may have RAM-disk programs or print spoolers, all of which can take up additional memory.

A far better approach would be to load the subroutine into BASIC's data area by defining an array large enough to hold the subroutine, and then fill the array using READ or BLOAD statements.

Copying Tape Onto Disks

Q: I have two questions. First, I am considering buying a database of 7 MB which is available on a standard computer tape. The options are 7 or 9 track, and 800, 1600 or 6250 bits per inch.

Is it possible to convert this tape to load into my PC with PC DOS 1.1 and BASIC?

Second, I would like to purchase a commercial program that is advertised as requiring two drives. I currently have only one. For the sake of costs and speed, can I buy more memory to use this program with a RAM-disk instead of a second drive?

Robert Savryk

San Francisco, California

A: A number of manufacturers, including Innovative Data Technology of San Diego, California offer one-half-inch tape drives that can be connected to a PC. Data, typically 9-track 1600 BPI, is read from tape, automatically buffered, converted from EBCDIC to ASCII, and transferred to the PC via an asynchronous port. The same unit can also be used to write tapes.

If you are concerned only with loading one database, the purchase of a tape drive may be unnecessarily expensive. Several service bureaus in San Francisco offer the capability of reading your tape. Once your tape has been loaded, you should be able to transfer the data to your PC through a modem program with data capture capability. At 1200 baud, however, a 7MB file would require about 16 hours, so you might not want to use this method.

As to your second question: The ability to use a RAM-disk for a program that requires two drives depends on the pro-

COMPUTER

*service bureaus have the
capability of loading
and reading tape.*

gram. If the program is not copy-protected, then you can just run DISKCOPY, insert the second disk intended for drive B, and copy it onto the RAM-disk instead. Remove the second disk from the drive and insert the first disk. The program will then run fine. After the program finishes, you might wish to DISKCOPY the RAM-disk back to the original second disk.

If the program is copy-protected, then most likely it will not work with a RAM-disk as the B drive.

Exporting Bugs

Q: Importing documents between VisiCalc and EasyWriter II is an attractive feature which we have not been able to access successfully. After many attempts, the EasyWriter II still is not receiving the imported VisiCalc files. In some cases, partial files are imported but in a random fashion. Please help!

Maureen Sayles
Ithaca, New York

A: The version of EasyWriter you use has a bug in its import/export feature. It will only work with single-sided disks. The easiest solution is to just have VisiCalc create its DOS files on a disk formatted as single-sided. Use the FORMAT B:1 syntax to format the target disk for VisiCalc.

This problem with VisiCalc is another example of why programs should not use operating systems of their own. /PC

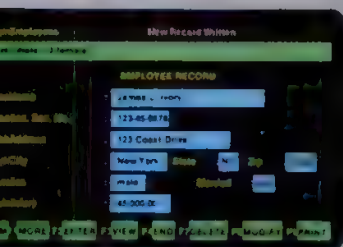
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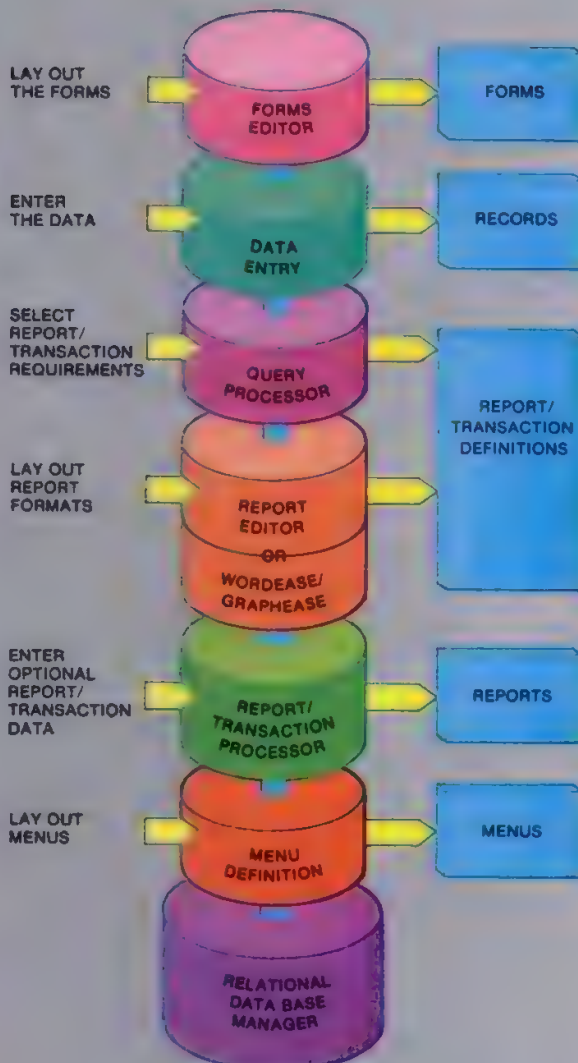
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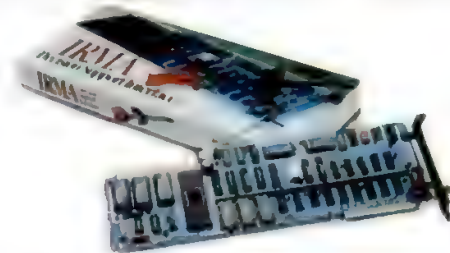


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A New England artist mixes his instinct for color and design with his interest in computing to create a lavish feast for the eyes.

COMPUTER ART FOR ART'S SAKE

If you think "computer art" consists mainly of dot matrix portraits on T-shirts and crazed spiders from higher outer space, you're not entirely wrong. As artistic tools, computers are still in their infancy—and most of the people who've gotten their hands on them probably draw more inspiration from REM statements than from Rembrandts.

"You know those spirographs that we all had when we were kids?" asks artist Mark Wilson. "Most of the computer art you see around I'd liken to spirograph pictures because, while the spirograph produces patterns that are very interesting and curious, it's just not relevant to the conventions of the art world."

Wilson is moving to change all that. For starters, he has the credentials that count in the art world: an MFA from Yale, several one-man shows at New York galleries, and a grant from the National Endowment for the Arts. As you can judge for yourself from the accompanying reproductions of his work, he has elevated computer art to a new, precipitously high plateau.

Wilson works in BASICA on a 64K, one-drive IBM PC hooked up to a medium-resolution Zenith composite color monitor and, via a serial port, to a plotter. In the tradition of Vasarely, Mondrian and

Klee, he creates vibrant, intricate geometric patterns on paper. Each one is as weirdly beautiful as a microscopic glimpse of a human hair or a drop of tap water.

Step back from the intricacy and you'll see macro designs that qualify as computer art not only in their digital origins but also in their imagery. There are many

STEP BACK
*from the intricacy and
you'll see macro designs
that qualify as
computer art not only in
their digital origins but
also in their imagery.*

purely evocative forms as well: sheets of what look like postage stamps or country kitchen tiles; snippets of hieroglyphics; shapes reminiscent of such disparate objects as the beaded work of American Indians, the circular paste-on reinforce-

ments for notebook paper, and diatoms. But if you look at Wilson's art and see primarily motherboards and rows of RAM chips, you won't be the only one. "It does look like circuit boards," the artist cheerfully acknowledges, "or, as someone once said, 'like the back of a TV set.'"

Not surprisingly, Wilson's "paintings" (which sell from \$250 to \$500) have been snapped up by the likes of Wang Laboratories, United Technologies, and the architect Philip Johnson.

Now 39, Wilson lives in rural Connecticut with his wife, Pamela, a high school social studies teacher, and their three sons. (Like most parents with a PC in the house, he occasionally threatens to take Microsoft's Decathlon "and throw the disk in the fireplace.") A pharmacist's son, he grew up in Oregon and studied at Pomona College in California.

Influence of High-Tech Imagery

"I started out being obsessed with photography," he remembers. "When I began painting, my work was always very linear, in the sense of a lot of lines, very detailed and very intricate. Later, I was influenced by microelectronics. The imagery of computer chips and circuits was extraordinary, just incredible! And beyond its riches and variety, it represented a new kind

of imagery." Such imagery, he adds, "isn't something I mimic or even necessarily make conscious reference to—but yes, it's there."

Around the same time, Wilson became

IF YOU look at Wilson's art and see primarily motherboards and rows of RAM chips, you won't be the only one.

aware of the work of an early eighteenth century French painter named P. Dominique Douat, who had created a set of patterned squares that could be combined into various decorative strings. It occurred

to Wilson that it would have been terrific if Douat had had access to a computer. For that matter, it would be terrific if he had access to a computer.

But a decade ago, as Wilson recalls, "it just wasn't possible. I was always very covetously looking at these plotters that cost about \$100,000 and that required a computer costing about three or four times that much."

Until the advent of the personal computer, Wilson relied on a mechanical drafting machine—a tool that he describes as "like a large straight-edge."

Painting By Numbers

Then, a little over 3 years ago, Wilson bought a Texas Instruments (TI) 99/4 home computer and a small Houston Instruments plotter. "It took a while to get all the right interfaces," he says. "Then I had to learn BASIC and learn to put graphics on the screen. And then there was the whole question of making images that I considered art." In fact, Wilson became so smitten by his new toy that, in addition to

this art work, he opened a small software business (Linear Aesthetics Systems) that markets a TI Rubik's Cube simulation

ATTRACTED by the IBM color/graphics board, Wilson upgraded last year to a PC and a larger plotter.

game, programmed, not surprisingly, by Mark Wilson.

Attacted by the IBM color/graphics board, Wilson upgraded last year to a PC and a larger plotter, a Tektronix 4663. The 4663 costs about \$12,000 new, but Wilson picked up a used one for half that with "a grant I'd just gotten from the National Endowment that was burning a hole in my

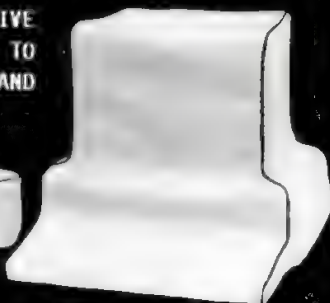
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The "4663" in the plotter's name, in fact, is the source for the titles of his paint-

EVENTUALLY
I'd like a compiler, but
my plotter moves about
22 inches a second, and
BASIC is always way
ahead of it.

ings: 4663 D12, 4663 E2, 4663 D10, 4663 C14. . . "They're totally uninspired, unromantic titles," sighs Wilson. Although—who knows?—in an industry prone to such catchy monickers as "MX-80," "8088," and "RS232-C," his titles may have a certain haut-tech chic.

Wilson mixes his own paint colors,

using what artists call "wet-ink pens" rather than the standard plotter colors. He also has written all his own graphics software. "My programs are relatively simple and inelegant," he insists. Everything is done in Advanced BASIC, without a compiler, and while Wilson is intrigued by the possibility of eventually programming in LOGO, he finds (BASIC haters, take note) that the BASICA graphics are sufficient for his needs. "Eventually, I'd like a compiler," he says, "but my plotter moves about 22 inches a second, and BASIC is always way ahead of it."

When Wilson began programming, he "thought it would be nifty to put a whole picture on the screen and then dump out." He's since decided, however, that "it's more fun to play it by ear, as the spirit moves me." He describes his creative method as "working interactively" with the hardware and the software. "I put various kinds of random lines, circles, rectangles, and little U-shapes and L-shapes on the screen," he explains. The software allows me to use the BASIC Point com-

mand to dump any of those shapes onto the plotter." Because the size of his paper (20 inches by 38 inches) is larger than the 17 inch by 22 inch work area permitted by the Tektronix, he has to scroll the canvas manually and inscribe it in sections.

Such techniques give the artist a certain sense of serendipity. "Most artists go about their work in an intuitive way:

HE DESCRIBES
his creative method as
"working interactively"
with the hardware and
the software.

They'll say, 'I want to put a red triangle in that corner,' whereas I'll have to say I want . . . say, an x coordinate of 2337 and a y coordinate of 2767. In a way, that's

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counter-intuitive, but from my standpoint, it produces variety.

"Unexpected things sometimes happen. Sometimes they're awful, of course, but sometimes they're good. Artists have a tendency to get stuck in ruts, and the computer has been known to jolt me out of mine." He hastens to add that "the idea isn't to get the computer to do the painting. I think of it the way a writer does a word processor—as a kind of clever, automatic helper."

Everything in Wilson's current work could be done by hand without a computer, "but I probably never would have done it. That's what's neat about these machines: They allow you to do things you wouldn't otherwise have the time or the gumption to try." (Even with the help of the computer, it takes Wilson several days to produce a graphic.)

Future Trends

As for the future of computer art, Wilson points out that "you can go back to the High Renaissance in the West and find a

lot of artists who were involved in mathematical analysis—that's what Albrecht Durer's woodcuts were, essentially." The

THE *contemporary split between what constitutes science and what qualifies as Art- with-a-capital-A is cultural, not natural.*

contemporary split between what constitutes science and what qualifies as Art-with-a-capital-A is cultural, not natural. At the Boston SIGGRAPH computer graphics show last year Wilson was "blown away" by trends in the field. He cites the work Dr. Benoit Mandelbrot, an

IBM Fellow who recently created a new branch of math, fractal geometry, that can be used to program irregular shapes into rather startling mainframe-computer graphics. According to Wilson, "Mandelbrot's fractal logarithms were used in the movie *The Wrath of Khan* to simulate the transformation of a particular planet's stony mountain landscape into lush green. I thought it was spectacular."

"Probably 99 percent of what these machines are used for is absolutely mundane and routine: accounts payable and so on," he adds. "But just the fact that they can be used by an artist or a musician or to do any of a hundred zany, crazy, offbeat things is a test of the power of these devices. It proves to me that they're really universal tools." /PC

For more information on Mark Wilson's paintings, contact the artist at P.O. Box 23, West Cornwall, CT 06796.

Lindsay Van Gelder is a contributing editor for PC Magazine.

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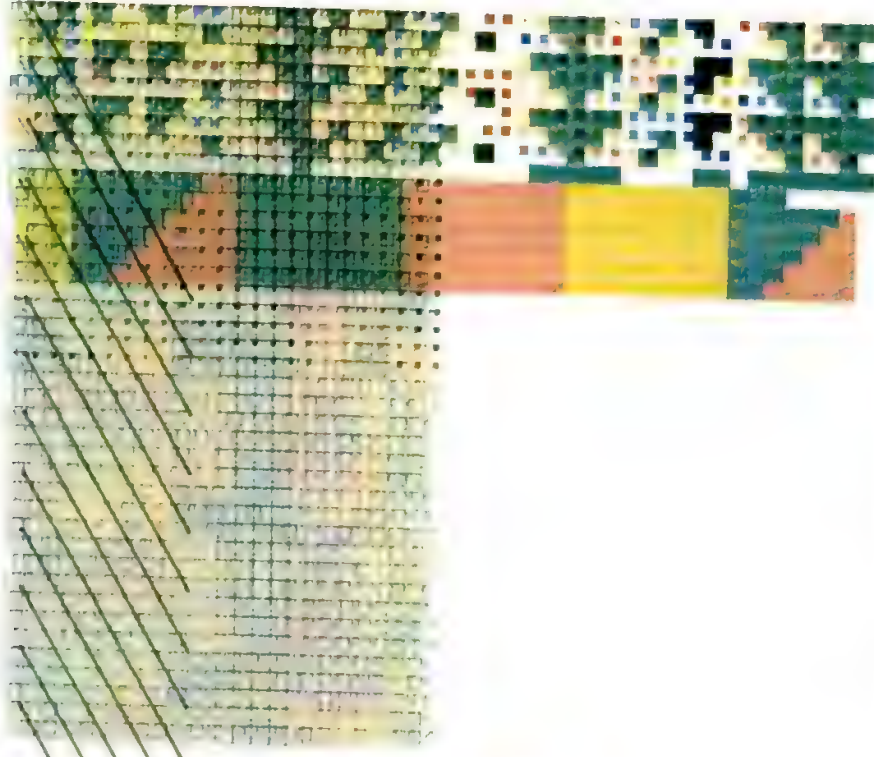
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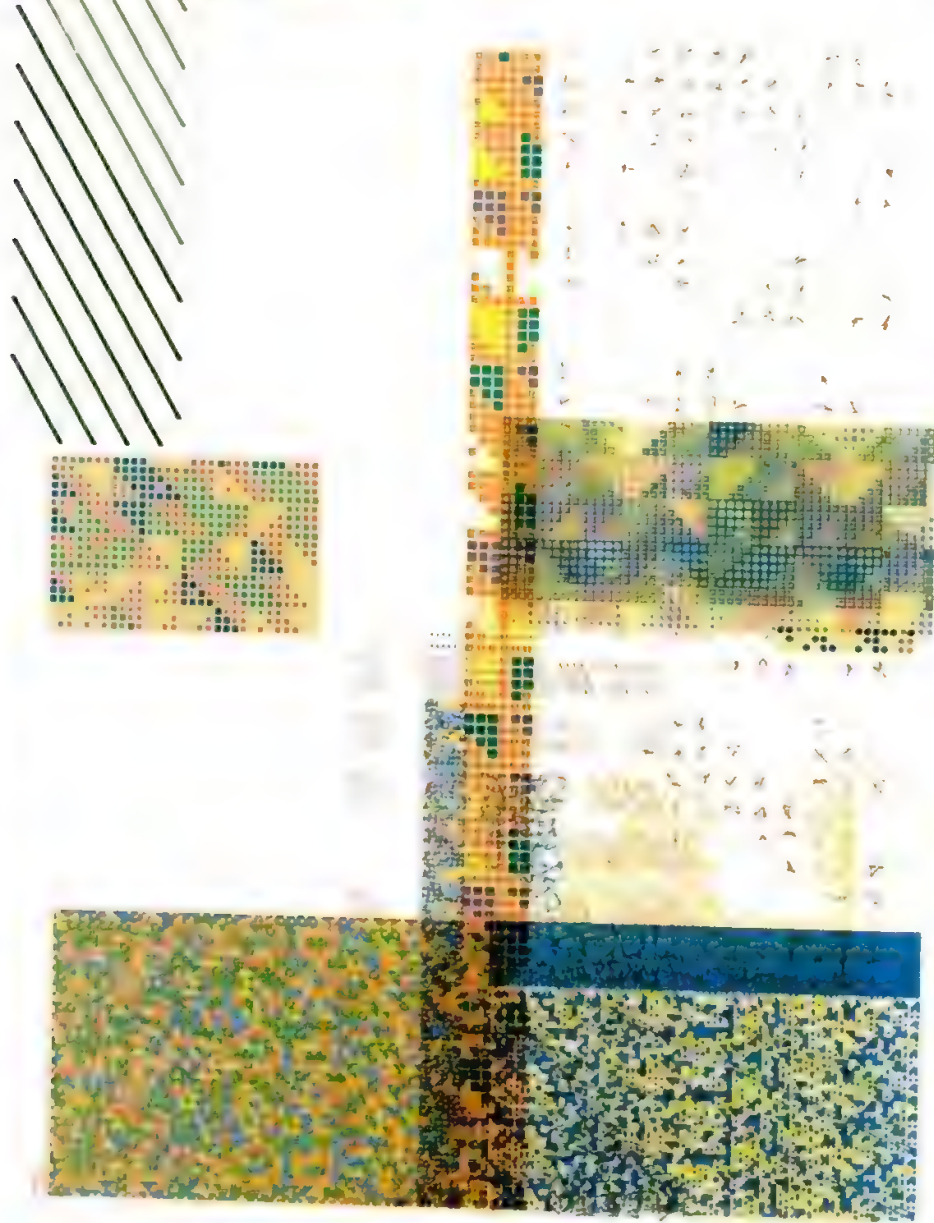
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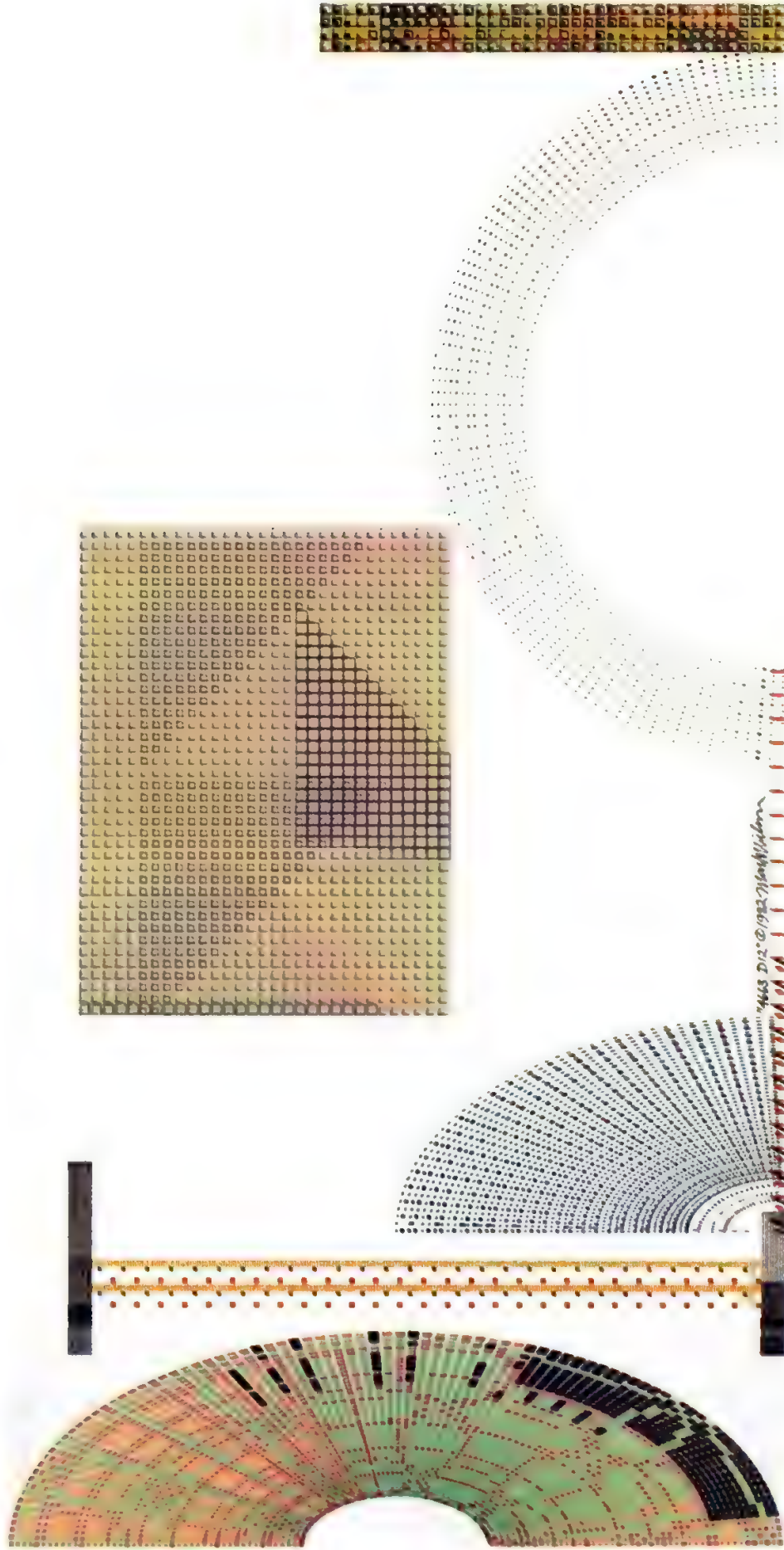
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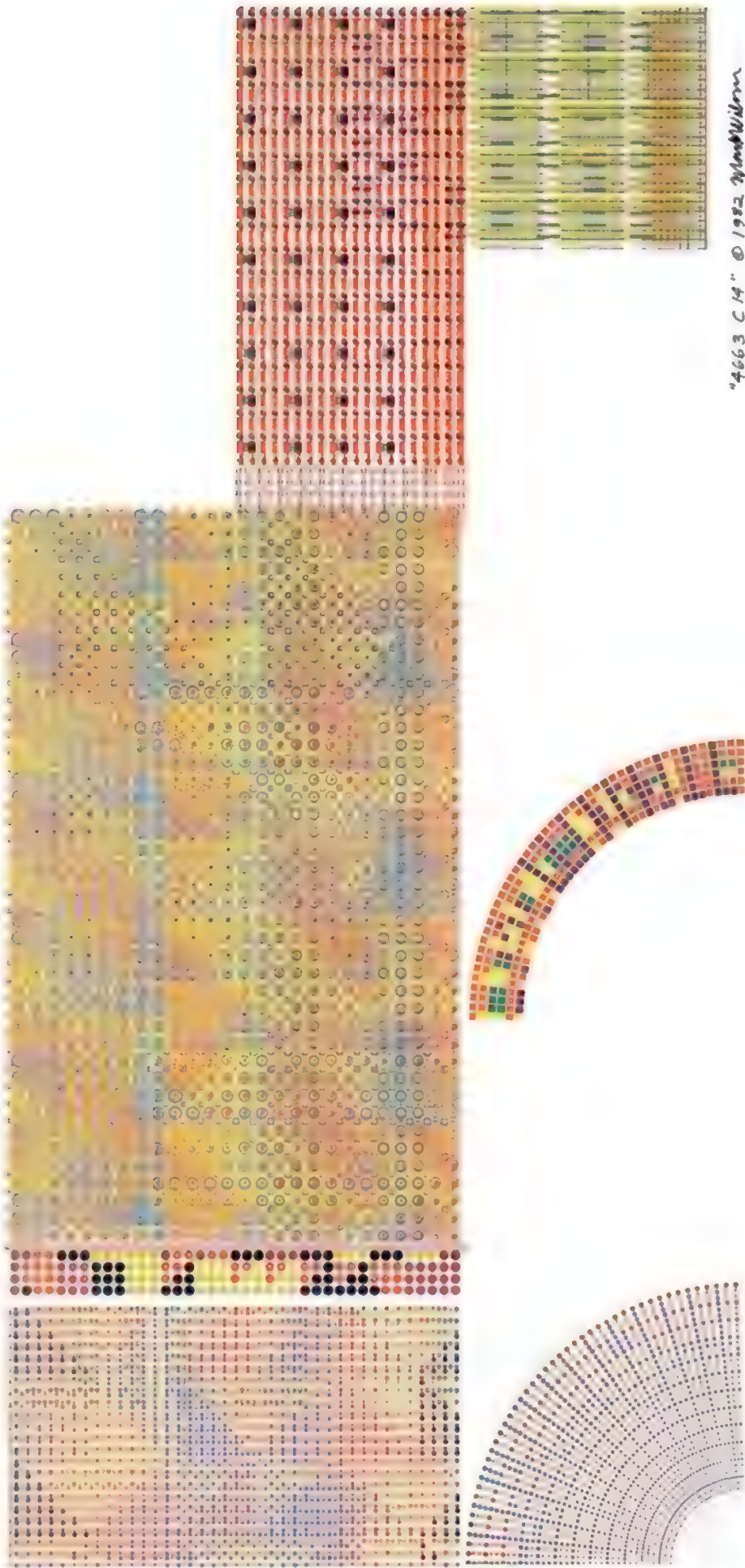
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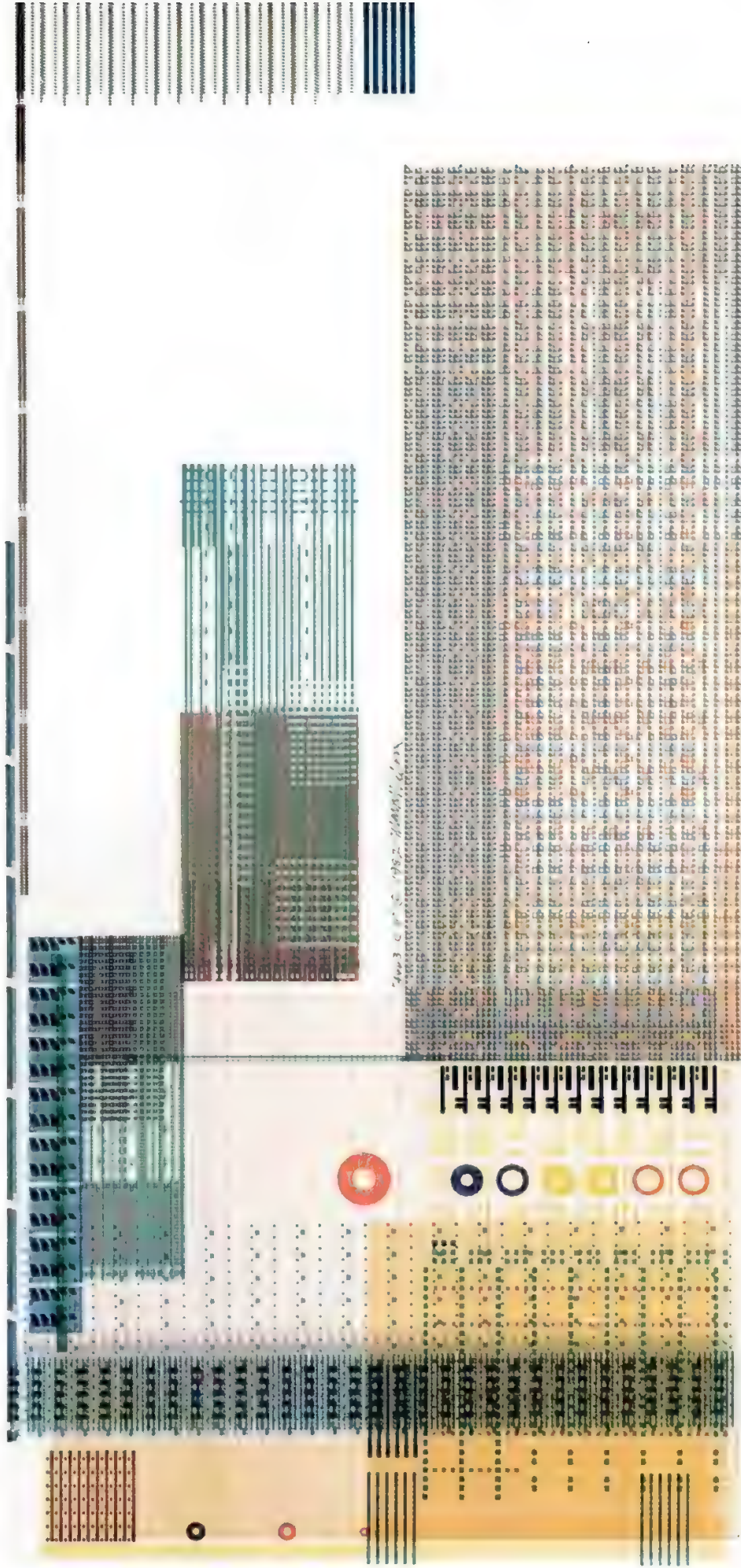


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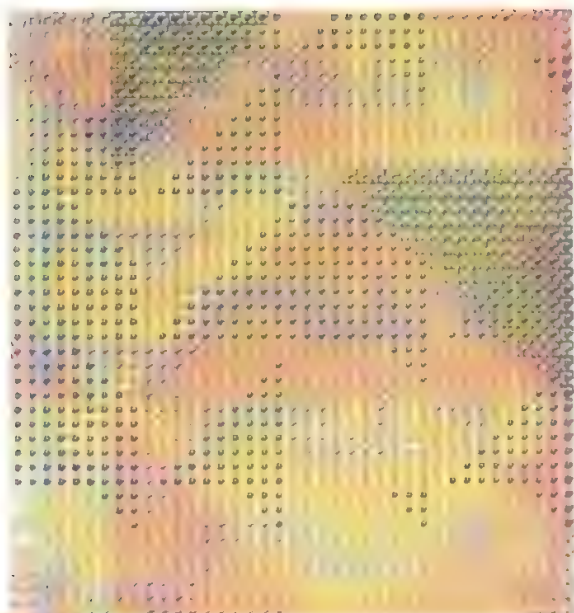
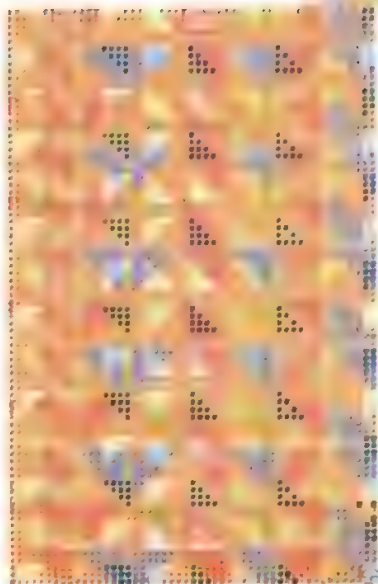
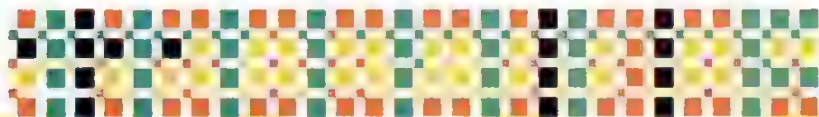
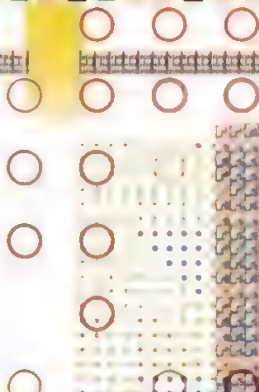
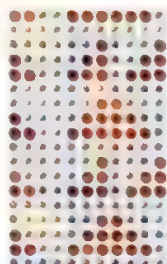
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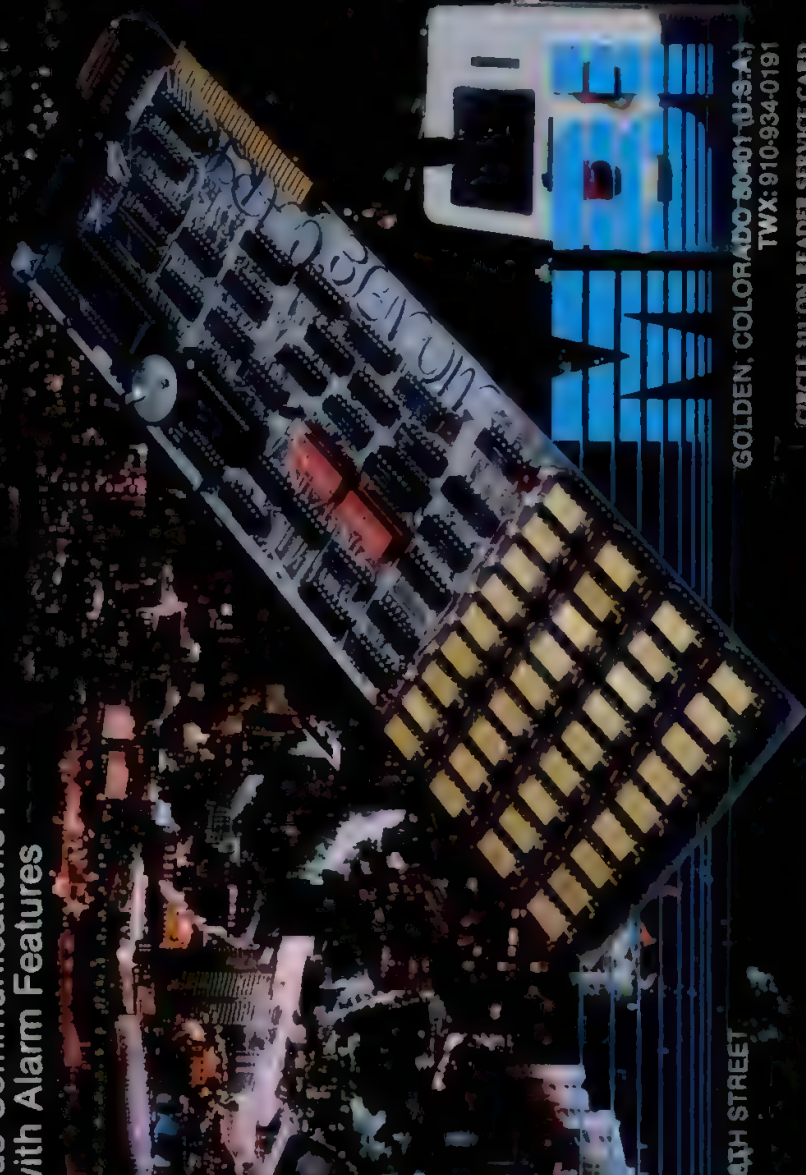
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Who Was P. Dominique Douat?

What goes around comes around.

P. Dominique Douat was a religieux Carme, a member of the Roman Catholic mendicant Order of Our Lady of Mount Carmel. We know that his lifetime bridged the late seventeenth and early eighteenth centuries. And we know his work. We know too that his place in history has been secured by the inclusion of his permutation tables in a publication of the Royal Academy of Sciences of Paris about 250 years ago.

We can only imagine the steady progression of his days—up before dawn to join his brothers in prayer and in the quotidian pursuit of monastic duty. Perhaps a sparse breakfast in a decoratively-bare but architecturally-rich room filled with stout tables.

Maybe each day after lunch and before vespers, Douat reserved a couple hours to pursue his private passion, the permutations that centuries later would so intrigue Mark Wilson.

Another question. Were these "graphic variations on a theme" the result of an interest unique to himself? It seems not. In the sixteenth century, Bernard de Lavineta published all permutations of the sequence BCDT. (In one of his books he discusses "artificial memory," distinguishing it sharply from "sensibilia" and "intelligibilia.") There are references to experimentation in this field as early as the fourteenth century.

Douat, then, was both the inheritor and the enlarger of a tradition. He was a man of his time—and, it turns out, a man of ours.

Douat started each permutation with a single two-colored square divided diagonally as shown in Figure 1. By rotating the square he achieved four variants. Combining these variants at different angles of rotation produces 16 possibilities.

Figure 2 shows his explanation of these permutations using letter symbols (A,B,C,D) to refer to the angles of rotation.

Sets of 3 produce 64 permutations, sets of 4, 256. Figures 3 and 4 show the last of these (from 193 to 256) in both letter and graphic representations.

There are 72 further variations shown in the plates of Douat's work. The first six of these is shown in Figure 5. The last in figure 6.

Douat's plates show the geometrical variants possible with only one simple form and only two colors. Vary the form—how about a triangle in a square? Or the color—blue,

WE CAN ONLY
imagine the steady progression of his days.

brown, purple? Try a little asymmetry; the exponential growth of variations stretches to infinity. It boggles the mind—but not the computer!

Mark Wilson says, "Douat's system, produced so laboriously with a pen almost 300 years ago, can be executed by a computer in a flash. And today, many computer graphics systems—LOGO, for example—have devised progressions of permutations identical to Douat's."

—Katherine Herrick

For more information, refer to *The Sense of Order* by E. H. Gombrich (pp. 70-72, Pheidon Press Limited, 1979). Also see the epilogue to *Ramon Lull and Lullism in Fourteenth Century France* by J. N. Hillgarth (Oxford Press, 1971). Prints of a sixteenth-century Lullian, Bernard de havinheta, can be found in his *Opera Omnia* (pp. 142-53, Bibliopolis, 1612).

Premiere

Seconde

Premiere Table

Contenant quatre Permutations

Seconde Table

Contenant seize Permutations

METHODE POUR PAIRS

DCDA	DAAA	D8AA	D8CB
D8DC	D8DB	DCAA	D8AC
DCDA	DCCC	D8CB	D8CB
DABD	DABD	D8CB	D8AC
DABD	DAAC	DACC	D8AB
DACD	D8BA	D8CB	DCBA
BCAD	D8CB	D8BA	DBAC
DBCD	DCCA	DACA	D8CB
DCBD	DCCB	D8CB	D8CA

XII. OBSERVATION

Les lettres A, B, C, & D, pris une à une, de droite à gauche, & de gauche à droite, à quatre reprises, recourent en tout les 24 lettres, qu'on peut permutations, à cet égard.

Vous représenterez de ces 24 permutations en quatre Tables, avec des lettres figurées. A fin de les classer.

PREMIERE TABLE.

Contenant quatre permutations. Voyez la première Planchette.

A	B	C	D
1	2	3	4

SECONDE TABLE

Contenant six permutations. Voyez la première Planchette

AA	BB	CC	DD
1	2	3	4
AB	BA	CA	DA
1	6	7	8
AC	BC	CA	BA
9	10	11	12
AD	BD	CD	DC
13	14	15	16

TROISIEME

121	DDDD	009 DAD	005 DBAD	041 DAB
126	DDDA	310 DBBD	016 DBACD	041 DCBB
121	DDBB	011 DCCD	007 DCAD	043 DACC
126	DDDC	003 DDAB	010 DBCD	004 DCCC
127	DDAD	011 DDBA	019 DCBD	041 DABA
127	DDBD	114 DDCB	010 DAAA	046 DABA
127	DDCD	019 DDCB	031 DDBB	047 DBAB
000 DADD	006 DDAC	010 DCCC	043 DBCB	
000 DADD	007 DDCA	113 DABA	049 DCAC	
000 DDDD	018 DADB	036 DABC	030 DCBC	
001 DDBA	009 DDBA	031 DDBA	031 DDBA	
124 DDBB	000 DADC	016 DDBC	011 DCAB	
009 DDDC	004 DCD A	007 DCCA	113 DCBA	
000 DADA	010 DDBC	010 DCCB	016 DCBA	
007 DDBD	013 DCCB	009 DDBA	011 DCAB	
007 DCCB	010 DABD	000 DCAA	016 DBCA	

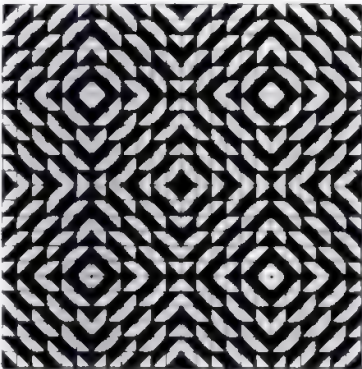
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595	596	597	598
599	600		

The image displays six distinct black and white geometric patterns arranged in a 3x2 grid. The patterns are as follows:

- Top Left:** A grid of squares, each containing a smaller square rotated 45 degrees, creating a tessellation of triangles.
- Top Right:** A grid of squares, each containing a smaller square rotated 45 degrees, with a different internal arrangement than the top-left pattern.
- Middle Left:** A pattern of interlocking zig-zag or chevron shapes, creating a sense of depth and movement.
- Middle Right:** A pattern of interlocking circles or diamonds, creating a tessellation of squares.
- Bottom Left:** A pattern of interlocking zig-zag or chevron shapes, similar to the middle-left pattern but with a different orientation.
- Bottom Right:** A pattern of interlocking circles or diamonds, similar to the middle-right pattern but with a different internal arrangement.

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The Permutations of Frère Douat

This program demonstrates the centuries-old geometrical theories rediscovered by Mark Wilson.

The program below fills the screen with intricate patterns of colored triangles, based on a series of permutations devised at the beginning of the eighteenth century by P. Dominique Douat. Triangles are among the best graphics building blocks, as they can form squares, rectangles, oblique parallelograms, stars, and other interesting shapes. Douat divided a square in half to form two right-angle triangles, and colored in one of the halves. He realized that by rotating this square he could produce four distinct patterns. Two such squares yielded 16 possible permutations, three squares 64, and four squares 256.

PC-Douat allows combinations of up to 9-square patterns. This is determined by the user-established level of symmetry. A setting of 0 produces a screenful of identical columns (with no variation); a setting of 1 adds one level of difference; 2 adds two, etc.

Users can also set the scale (size) and spacing. The smallest scale setting will produce tiny triangles 3 pixels high; the largest, ungainly triangles that measure 40-pixels. To obtain Douat's original spacing, set the spacing factor 1 higher than the scale. A typical setting would be a scale of 5 and a spacing of 6. Smaller figures take longer to fill the screen but seem to produce the most interesting effects; larger ones take up so much room they don't really show the program to its best advantage.

Startling effects can be produced by backing up triangles over each other, that is, by entering smaller spacing factors than scaling factors. The program will warn you that the spacing is tight if you try to do this, but will let you continue. Other interesting patterns can result from small scaling factors and large spacing settings that will spread out tiny triangles across your screen.

PC-Douat allows you to switch back and forth between palettes, and escape to the main menu from any point in the program. Once you produce an initial screen, the

S **TARTLING**
*effects can be produced by backing up triangles
over each other.*

menu will remind you which settings you entered for the previous pattern. The permutations are based partially on random numbers pulled out of an array. It will take a little more than a minute to fill this array the first time you use the program.

You can adapt PC-Douat to dump the screen to a color printer, or even an IBM graphics printer that can produce different gray levels. You can also experiment with it by changing the PSET action in the PUT statements to PRESET, which will produce a pattern of negative images, or by drawing and painting such figures as circles rather than triangles. PC-Douat requires the IBM color graphics board, but will work on both color and monochrome screens.

—Paul Somerson

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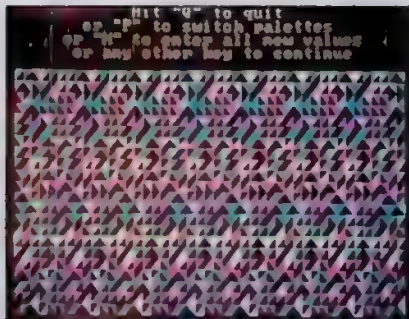


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CIRCLE 212 ON READER SERVICE CARD



```

100 ' "PC-DOUAT" -- For readers of PC Magazine / Volume 1, Number 12
110 ' (c) 1983 Mark Wilson; adapted for PC Magazine by Paul Somerson
120 '
130 ' This program produces very intricate geometric designs
140 ' using an 18th century algorithm. When you start using
150 ' this try entering S-M-A-L-L scaling and spacing values.
160 ' Later, experiment with various numerical combinations--
170 ' including smaller SPACING factors than SCALING factors.
180 ' The lower the symmetry factor the more orderly the art.
190 '
200 ' *** initial setup; color or mono monitor ***
210 '
220 FOR FK=1 TO 10:KEY FK,"":NEXT
230 TEST=0:DEFINT A-Z:KEY OFF:SCREEN 0,1:COLOR 7,0,0:WIDTH 80
240 COL1=7:COL2=7:COL3=7:COL4=7:COL5=7:COL6=7:COL7=7:COLA=23
250 DIM D1(400),D2(400),D3(400),D4(400),D5(400),D6(400)
260 DIM D7(400),D8(400),D9(400),D10(400),D11(400),D12(400)
270 RANDOMIZE (VAL(RIGHT$(TIME$,2))):QS=CHR$(34):CLS
280 LOCATE 10,23,0:PRINT "Do you have a color monitor? (Y/N)"
290 IN$=INKEY$:IF IN$="" THEN 290
300 IF IN$="Y" OR IN$="y" THEN 310 ELSE 350
310 COL1=1:COL2=2:COL3=3:COL4=4:COL5=5:COL6=6:COL7=7:COLA=20
320 '
330 ' *** box elements ***
340 '
350 COLOR COL1:CLS
360 TS=CHR$(201)+STRING$(23,205):TR$=STRING$(23,205)+CHR$(187)
370 BS=CHR$(200)+STRING$(23,205):BR$=STRING$(23,205)+CHR$(188)
380 LOCATE 6,17:PRINT TS+TR$:VS=CHR$(186)
390 FOR W=7 TO 14:LOCATE W,17:PRINT V$:LOCATE W,64:PRINT V$:NEXT
400 LOCATE 15,17:PRINT BS+BR$
410 '
420 ' *** title ***
430 '
440 COLOR COL4:LOCATE 8,36:PRINT QS;"PC-DOUAT";QS:COLOR COL2
450 LOCATE 10,19:PRINT "This produces patterns based on permutations"
460 LOCATE 11,22:PRINT "suggested by P. Dominique Douat in 1704"
470 COLOR COL6:LOCATE 13,28:PRINT "(Hit any key to continue)"
480 JS=INKEY$:IF JS="" THEN 480
490 '

```

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CIRCLE 208 ON READER SERVICE CARD

```

500 ' *** twin boxes and storage of old values ***
510 '
520 COLOR COL1:CLS:LOCATE 3,18:PRINT TL$+TR$
530 FOR W=4 TO 12:LOCATE W,18:PRINT V$:LOCATE W,65:PRINT V$:NEXT
540 LOCATE 13,18:PRINT BL$+BR$:COLOR COL5
550 COLOR COL5:LOCATE 14,18:PRINT TL$+TR$
560 FOR W=15 TO 19:LOCATE W,18:PRINT V$:LOCATE W,65:PRINT V$:NEXT
570 LOCATE 20,18:PRINT BL$+BR$
580 COLOR COL4:LOCATE 16,27:PRINT "(Hit <ENTER> key if necessary)"
590 IF OLDSpace=0 THEN 640 ELSE COLOR COL2
600 LOCATE 17,43:PRINT "Old spacing #:";OLDSpace
610 LOCATE 17,24:PRINT "Old scale #:";OLDScale
620 LOCATE 18,43:PRINT "Old symmetry #:";OLDSym
630 LOCATE 18,24:PRINT "Old random #:";OLDRand;SPC(3):GOTO 680
640 COLOR COL2:LOCATE 18,31:PRINT "Hit <ESC> to start over"
650 '
660 ' *** random factor ***
670 '
680 COLOR COL6:LOCATE 5,23,0:PRINT "Enter a random factor from 0 to 9:"
690 J$=INKEY$:IF J$="" THEN 690
700 IF J$=CHR$(27) THEN 520
710 RFAC=VAL(J$):IF RFAC<0 OR RFAC>9 THEN 690
720 LOCATE 5,57:COLOR COL3:PRINT RFAC:COLOR COL6
730 '
740 ' *** scale factor ***
750 '
760 LOCATE 7,23:PRINT "Enter a scale factor from 3 to 40:";SPC(3):SF$=""
770 J$=INKEY$:IF J$="" THEN 770
780 IF J$=CHR$(27) THEN 520
790 IF SF$="" AND J$="0" THEN BEEP:GOTO 770
800 IF J$=CHR$(13) AND LEN(SF$)=1 THEN SF$=" "+SF$:GOTO 830
810 IF ASC(J$)>47 AND ASC(J$)<58 THEN 820 ELSE BEEP:GOTO 770
820 SF$=SF$+J$:LOCATE 7,58:COLOR COL3:PRINT SF$
830 IF LEN(SF$)=2 THEN DX=VAL(SF$):GOTO 840 ELSE 770
840 IF DX>40 OR DX<3 THEN BEEP:COLOR COL6:GOTO 760
850 '
860 ' *** symmetry factor ***
870 '
880 COLOR COL6:LOCATE 9,23:PRINT "Enter a symmetry factor from 0 to 9:"
890 J$=INKEY$:IF J$="" THEN 890
900 MF=VAL(J$):IF J$=CHR$(27) THEN 520
910 IF MF<0 OR MF>9 THEN 890 ELSE COLOR COL3:LOCATE 9,59:PRINT MF:COLOR COL6
920 '
930 ' *** spacing factor ***
940 '
950 LOCATE 11,23:PRINT "Enter a spacing factor from 2 to 99:";SPC(3):SPF$=""
960 J$=INKEY$:IF J$="" THEN 960
970 IF J$=CHR$(27) THEN 520
980 IF SPF$="" AND J$="0" THEN BEEP:GOTO 960
990 IF J$=CHR$(13) AND LEN(SPF$)=1 THEN SPF$=" "+SPF$:GOTO 1020
1000 IF ASC(J$)>47 AND ASC(J$)<58 THEN 1010 ELSE BEEP:GOTO 960
1010 SPF$=SPF$+J$:LOCATE 11,60:COLOR COL3:PRINT SPF$
1020 IF LEN(SPF$)=2 THEN DSP=VAL(SPF$):GOTO 1030 ELSE 960
1030 IF DSP>99 OR DSP<2 THEN BEEP:COLOR COL6:GOTO 950
1040 '
1050 ' *** warning if spacing = or < object size ***
1060 '
1070 IF DSP<=DX THEN 1080 ELSE 1170
1080 FOR W=16 TO 18:LOCATE W,19:PRINT SPC(41):NEXT
1090 COLOR COL4:LOCATE 16,27:PRINT "WARNING—your spacing is tight"
1100 COLOR COL3:LOCATE 17,29:PRINT "Hit ";Q$;"C";Q$;" to continue anyway"
1110 COLOR COL6:LOCATE 18,25:PRINT "Or hit any other key to start over"
1120 JK$=INKEY$:IF JK$="" THEN 1120
1130 IF JK$="C" OR JK$="c" THEN 1170 ELSE 520
1140 '
1150 ' *** palette selection ***
1160 '
1170 FOR W=16 TO 18:LOCATE W,19:PRINT SPC(41):NEXT
1180 COLOR COL4:LOCATE 16,27:PRINT "———SELECT A PALETTE———"
1190 COLOR COL3:LOCATE 17,28:PRINT "Hit ";Q$;"1";Q$;" for blue/cyan/magenta"
1200 COLOR COL6:LOCATE 18,28:PRINT "Hit ";Q$;"2";Q$;" for green/red/yellow"
1210 PAL=VAL(INKEY$):IF PAL<1 OR PAL>2 THEN 1210
1220 SCREEN 1,0:COLOR 0,PAL:CLS:I=1
1230 OLDRand=RFAC:OLDScale=DX:OLDSym=MF:OLDSpace=DSP
1240 '
1250 ' *** Douat permutations ***

```



```

1260 '
1270 LINE(0,0)-(DX,0),I:LINE-(0,DX),I:LINE-(0,0),I
1280 PAINT(1,1),I:GET(0,0)-(DX,DX),D1:CLS
1290 LINE(0,0)-(0,DX),I:LINE-(DX,0),I:LINE-(0,0),I
1300 PAINT(1,2),I:GET(0,0)-(DX,DX),D2:CLS
1310 LINE(0,DX)-(DX,DX),I:LINE-(DX,0),I:LINE-(0,DX),I
1320 PAINT(DX-1,DX-1),I:GET(0,0)-(DX,DX),D3:CLS
1330 LINE(0,0)-(DX,DX),I:LINE-(DX,0),I:LINE-(0,0),I
1340 PAINT(2,1),I:GET(0,0)-(DX,DX),D4:CLS:I=I+1
1350 LINE(0,0)-(DX,0),I:LINE-(0,DX),I:LINE-(0,0),I
1360 PAINT(1,1),I:GET(0,0)-(DX,DX),D5:CLS
1370 LINE(0,0)-(0,DX),I:LINE-(DX,0),I:LINE-(0,0),I
1380 PAINT(1,2),I:GET(0,0)-(DX,DX),D6:CLS
1390 LINE(0,DX)-(DX,DX),I:LINE-(DX,0),I:LINE-(0,DX),I
1400 PAINT(DX-1,DX-1),I:GET(0,0)-(DX,DX),D7:CLS
1410 LINE(0,0)-(DX,DX),I:LINE-(DX,0),I:LINE-(0,0),I
1420 PAINT(2,1),I:GET(0,0)-(DX,DX),D8:CLS:I=I+1
1430 LINE(0,0)-(DX,0),I:LINE-(0,DX),I:LINE-(0,0),I
1440 PAINT(1,1),I:GET(0,0)-(DX,DX),D9:CLS
1450 LINE(0,0)-(0,DX),I:LINE-(DX,0),I:LINE-(0,0),I
1460 PAINT(1,2),I:GET(0,0)-(DX,DX),D10:CLS
1470 LINE(0,DX)-(DX,DX),I:LINE-(DX,0),I:LINE-(0,DX),I
1480 PAINT(DX-1,DX-1),I:GET(0,0)-(DX,DX),D11:CLS
1490 LINE(0,0)-(DX,DX),I:LINE-(DX,0),I:LINE-(0,0),I
1500 PAINT(2,1),I:GET(0,0)-(DX,DX),D12:CLS
1510 '
1520 '
1530 '
1540 IF TEST=0 THEN DIM RA(20,100):TEST=1 ELSE 1680
1550 RANDOMIZE(8087):KN=0:SCREEN 0:WIDTH 80:COLOR COLA:CLS:LOCATE 10,21,0
1560 PRINT "Filling an array. Sorry for the delay."
1570 COLOR COL1:LOCATE 12,33:PRINT "cells left to fill,":COLOR COL3
1580 COLOR COL1:LOCATE 14,33:PRINT "seconds remaining.":COLOR COL3
1590 FOR I=1 TO 20:FOR J=1 TO 80
1600 KN=KN+1:TOT=1600-KN
1610 LOCATE 12,28:PRINT USING "####";TOT
1620 LOCATE 14,30:PRINT USING "##";(INT(TOT*.05))+1
1630 RA(I,J)=RND*11+1
1640 NEXT:J=J+1
1650 '
1660 '
1670 '
1680 K=RND*19:KK=K:IF K+MF>20 THEN 1680
1690 SCREEN 1:COLOR 0,PAL:CLS:IF K+MF>20 THEN 1680
1700 LOCATE 3,9:PRINT "Hit <ESC> to start over"
1710 FOR X1=0 TO 318-DX STEP DSP:J=0
1720 FOR Y1=39 TO 198-DX STEP DSP
1730 IF INKEY$=CHR$(27) THEN SCREEN 0:WIDTH 80:GOTO 520
1740 J=J+1:I=RA(K,J)
1750 ON I GOTO 1760,1770,1780,1790,1800,1810,1820,1830,1840,1850,1860,1870
1760 PUT(X1,Y1),D1,PSET:GOTO 1880
1770 PUT(X1,Y1),D2,PSET:GOTO 1880
1780 PUT(X1,Y1),D3,PSET:GOTO 1880
1790 PUT(X1,Y1),D4,PSET:GOTO 1880
1800 PUT(X1,Y1),D5,PSET:GOTO 1880
1810 PUT(X1,Y1),D6,PSET:GOTO 1880
1820 PUT(X1,Y1),D7,PSET:GOTO 1880
1830 PUT(X1,Y1),D8,PSET:GOTO 1880
1840 PUT(X1,Y1),D9,PSET:GOTO 1880
1850 PUT(X1,Y1),D10,PSET:GOTO 1880
1860 PUT(X1,Y1),D11,PSET:GOTO 1880
1870 PUT(X1,Y1),D12,PSET:GOTO 1880
1880 NEXT:K=K+1:IF K>KK+MF THEN K=KK
1890 NEXT
1900 '
1910 '
1920 '
1930 LOCATE 1,13:PRINT "Hit ";Q$;"Q";Q$;" to quit"
1940 LOCATE 2,8:PRINT "or ";Q$;"P";Q$;" to switch palettes"
1950 LOCATE 3,6:PRINT "or ";Q$;"N";Q$;" to enter all new values"
1960 LOCATE 4,7:PRINT "or any other key to continue"
1970 C$=INKEY$:IF C$="" THEN 1970
1980 IF C$="P" OR C$="p" THEN PAL=PAL+1:COLOR 0,PAL:GOTO 1970
1990 IF C$="Q" OR C$="q" THEN LOCATE 1,1:END
2000 IF C$="N" OR C$="n" THEN 2010 ELSE 1680
2010 SCREEN 0:WIDTH 80:TEST=1:GOTO 520

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CIRCLE 239 ON READER SERVICE CARD

The tour begins with a visit to the realm of the fixed disk, followed by a gaze into the inner sanctum of the expansion slots, home of the elusive RAM . . .

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CIRCLE 590 ON READER SERVICE CARD

IBM's PC-XT is something old, something new, something borrowed, and something Blue.

The old is IBM's continuance of the PC line, with the 16/8-bit technology of the 8088 microprocessor and the same line of separate monochrome and color/graphics display adapters. The new comes in the form of a 10-megabyte fixed disk and a redesigned system board with four times the capacity for internal memory. Still

borrowed are the major building blocks of the PC, including the new fixed disk drive and a stunning new color monitor. But the real impact of IBM's first major expansion of its personal computer product line comes not from new technology but instead in the realm of marketing: Big Blue has reached out aggressively to claim an even bigger share of the market it



launched 18 months ago when it introduced the PC.

Not only has IBM announced an attractive advanced version of its popular PC, but it has, in effect, dropped all of its personal computer prices about 15 percent. Further, its new fixed disk drive and proprietary adapter employ a "tree" structure derived from a new DOS 2.0 and puts the IBM stamp of approval on a branch of technology different from that pursued by

IBM NOW officially supports expansion of the PC-XT internal memory to 640K.

independent manufacturers in the past year. IBM's new color monitor offers a level of resolution and color separation unmatched by other companies' monitors in its price range and well above.

IBM also announced adapter cards and "black boxes" to allow connection of its popular 3278 mainframe computer terminals to PCs, a move that should increase the placement of IBM microcomputer products in offices.

But Is It Compatible?

The PC-XT is said to be "downwardly" compatible with hardware and software developed for the PC. However, the inclusion of extra memory on the system board, an asynchronous communications adapter, an "official" IBM fixed disk, and a few extra expansion slots may have an impact on the sales (or at least the designs) of the dozens of memory cards and "combo" cards sold by independent companies.

The base PC-XT system, priced at \$4,995 at IBM Product Centers, features 128K RAM on the system board. One double-sided floppy disk drive and one 10-megabyte fixed disk drive are installed in the system unit. (DOS 2.0 allows the user to format double-sided disks at the previous density of 320K or with one additional sector for a total of 360K.) Also included are the disk and disk adapter cards and the asynchronous adapter, which take up

three of the eight expansion slots on the PC-XT (the PC has five).

IBM now officially supports expansion of the PC-XT internal memory to 640K, using its available memory cards to add as much as 384K RAM.

Also announced were two expansion units, one for the PC-XT and one for the PC. With the expansion unit, either machine can support two double-sided disk drives and two 10-megabyte hard disks for a total storage of nearly 22 million characters of information or the equivalent of about 11,000 double-spaced typewritten pages. The PC-XT drives also give the user a total of 12 available expansion slots; a PC with expansion unit offers 9 available slots.

New Features

The PC-XT's system board now uses 64K RAM chips instead of the 16K chips that were standard on the PC. (Interestingly, the memory chips on the PC-XT tested by PC Magazine were all American-made Texas Instruments devices, a change from the international mix used in most PCs.) The standard allotment of 128K takes up only half of the available plug-ins on the board, allowing 256K without use of an expansion or combo card. The system board includes only one switch to indicate memory and options. The all-but-neglected cassette port on the PC has been dropped for the PC-XT model. A "color trimmer capacitor" has been added to allow adjustment of the RGB color output.

The power supply on the PC-XT draws 130 watts, more than double the requirements of the PC's 63.5 watt supply. The additional power is needed for the fixed disk and the three extra expansion slots. The PC-XT's fan and the fixed disk were also noticeably noisier in operation than the original. The expansion unit includes its own power supply and fan.

The system board continues with 40K ROM, but these circuits have been redesigned to support DOS 2.0 and BASIC 2.0. The system now goes through a more involved "Power-On Startup Test" (POST), including a segment-by-segment examination of system memory. A new diagnostics disk included with the Guide to Operations features greatly expanded tests (including the option to continue with start-up in most instances, even if the

machine is reporting a failure.) The diagnostics include a comprehensive test of the actions of joysticks and paddles that might be attached to the game adapter. A new section also allows testing of the fixed disk.

Six of the eight PC-XT expansion slots allow "full-size" cards; the remaining two spaces are about half-length. The shorter locations could be used for game adapters or communications cards. The slots are slightly closer together than those on the PC, and "piggy-back" double boards may not fit in the PC-XT. Also changed is the design of the back slots. IBM will supply different mounting brackets for option cards purchased for use on the PC-XT. Independent manufacturers should also be able to offer the new brackets.

The PC-XT uses the same keyboard (with its strong points as well as its faults) as does the PC.

More Guidance

The Guide to Operations has been expanded to include a full section devoted to the IBM 80 cps Matrix Printer and the IBM 80 cps Graphics Printer (first cousins to the Epson MX-80 and the Epson MX-80 with Grafrax, respectively.) The new section describes the various printer codes, including normal, compressed, emphasized and double-strike images, as well as subscripts, superscripts and underlines.

THE POWER supply on the PC-XT draws 130 watts, more than double the requirements of the PC's 63.5 watt supply.

The expansion units for the PC-XT and the PC come with one 10-megabyte fixed disk drive and eight expansion slots. Six of the slots are full-length, while two will accept only shorter cards. One of the long slots is used by an adapter for the fixed disk drive and a second is used for a "receiver" card to communicate with the system unit.

The expansion boxes themselves are



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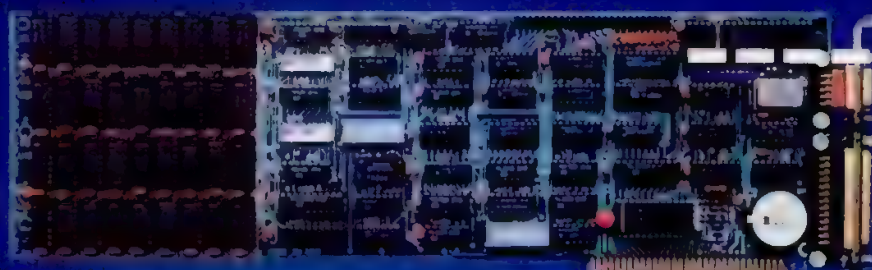
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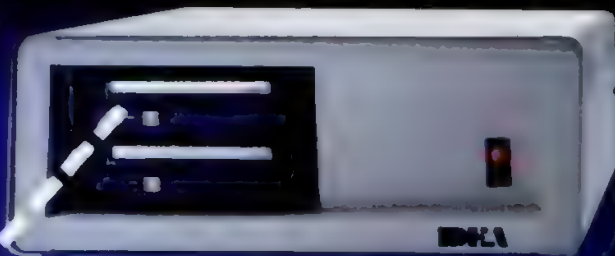
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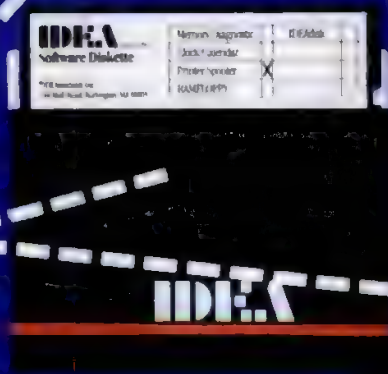
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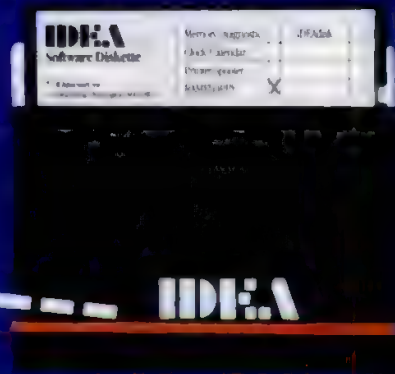
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identical to the PC-XT frame. They are 20 inches in length by 16 inches in depth and 6 inches high weighing in at 27 pounds. (The PC-XT with hard disk weighs 32 pounds.)

If you use an expansion unit with your PC-XT, you must move your fixed disk

sided floppy disk drive to the system unit, if desired. The unit comes with a 39-inch-long cable.

The PC expansion unit allows you to add one or two fixed disk drives, leaving one or two floppy disk drives in the system unit.

Slipping a New Disk

IBM's fixed disks have the same physical dimensions and mounting procedure as the floppy disk drives and carry IBM's official blessing as "customer installable." They offer 10,240,000 bytes of storage. The four surfaces of the hard disks spin at 3,600 rpm, and are divided into 17 sectors of 512 bytes each, with 306 tracks per surface. IBM claims a 90 millisecond average access time for data and a 5 million bits-per-second transfer rate.

The drive in the PC-XT we examined was apparently manufactured by Seagate for IBM. The motor was made in Germany. Interestingly, the PC-XT *Hardware Maintenance and Service Manual* includes drawings of a "Type 1" and a "Type 2"

10-megabyte fixed drive, perhaps indicating that IBM has had to go to two different suppliers to obtain sufficient quantities of fixed disk drives. Type 1 has a rounded back and a power connector attached to the circuit board; Type 2 is a completely sealed box with its power connector at the end of a short cable. Ours was a Type 1. An IBM spokesman had no comment on the meaning of the two drawings in the manual. Therefore, we must stick by our presumption that there are two different suppliers.

The fixed disk drive adapter (used in the PC-XT or either of the expansion units) features microprocessor-controlled 32-bit error-correction code, on-board sector buffers, internal diagnostics, DMA data transfer, automatic error detection and correction, and automatic retries on disk access.

In another interesting difference, the double-sided floppy disk drive installed in the PC-XT we examined was apparently manufactured by the Control Data Corporation (CDC). Most of the early PCs used

***T**HE PC-XT'S fan and the fixed disk were also noticeably noisier.*

drive and its adapter card from the system unit to the expansion unit. In place of the fixed disk drive adapter card in the system unit, you must install an "extender card," which has a cable port to connect to the receiver card in the expansion unit. You are then free to add a second double-



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Other Enhancements

The advertisement features two IBM PC expansion cards in the foreground. The card on the left is a DiskPlus Hard Disk Host Adaptor, and the card on the right is an Expansion Memory module. Both cards are populated with numerous integrated circuits and components. In the background, two IBM manuals are visible: the 'Guide to Operations' (model 6025000) and the 'BASIC' manual (model 6025010). Labels with leader lines point to specific components on the left card: Async #1, Clock, DMA, Host Connector, Battery, 64-512K (with MegaPak), and MegaPak Option. A circular badge on the right side of the image displays the price '\$295 New Price'.

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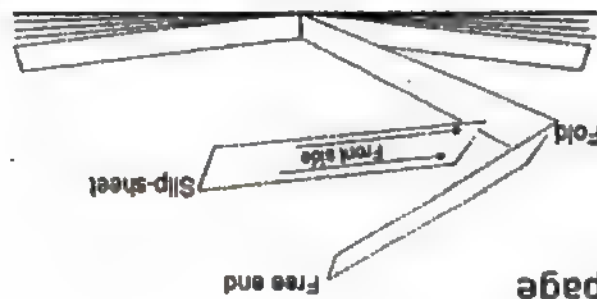
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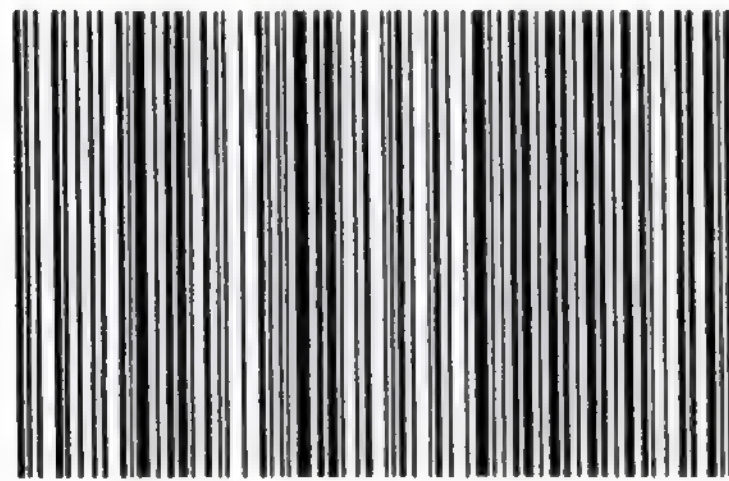
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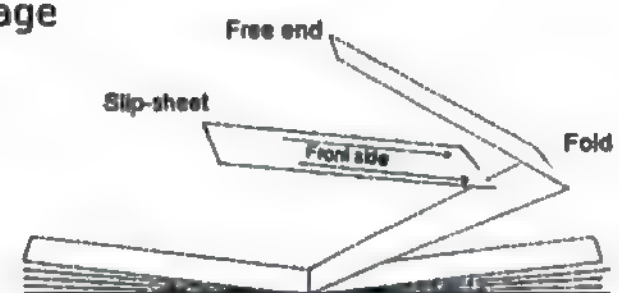


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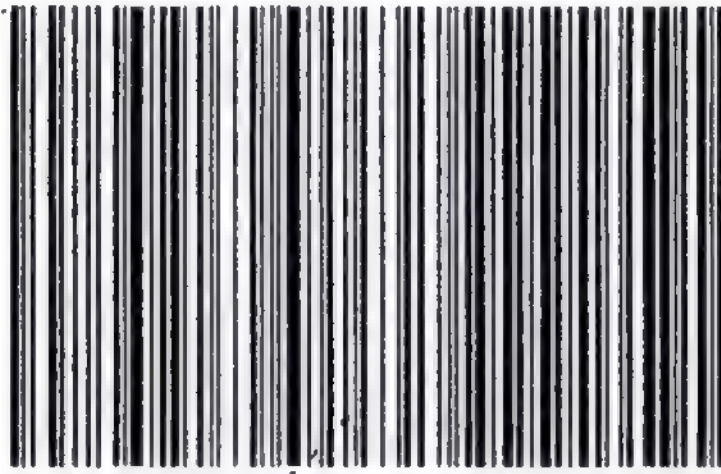
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Back

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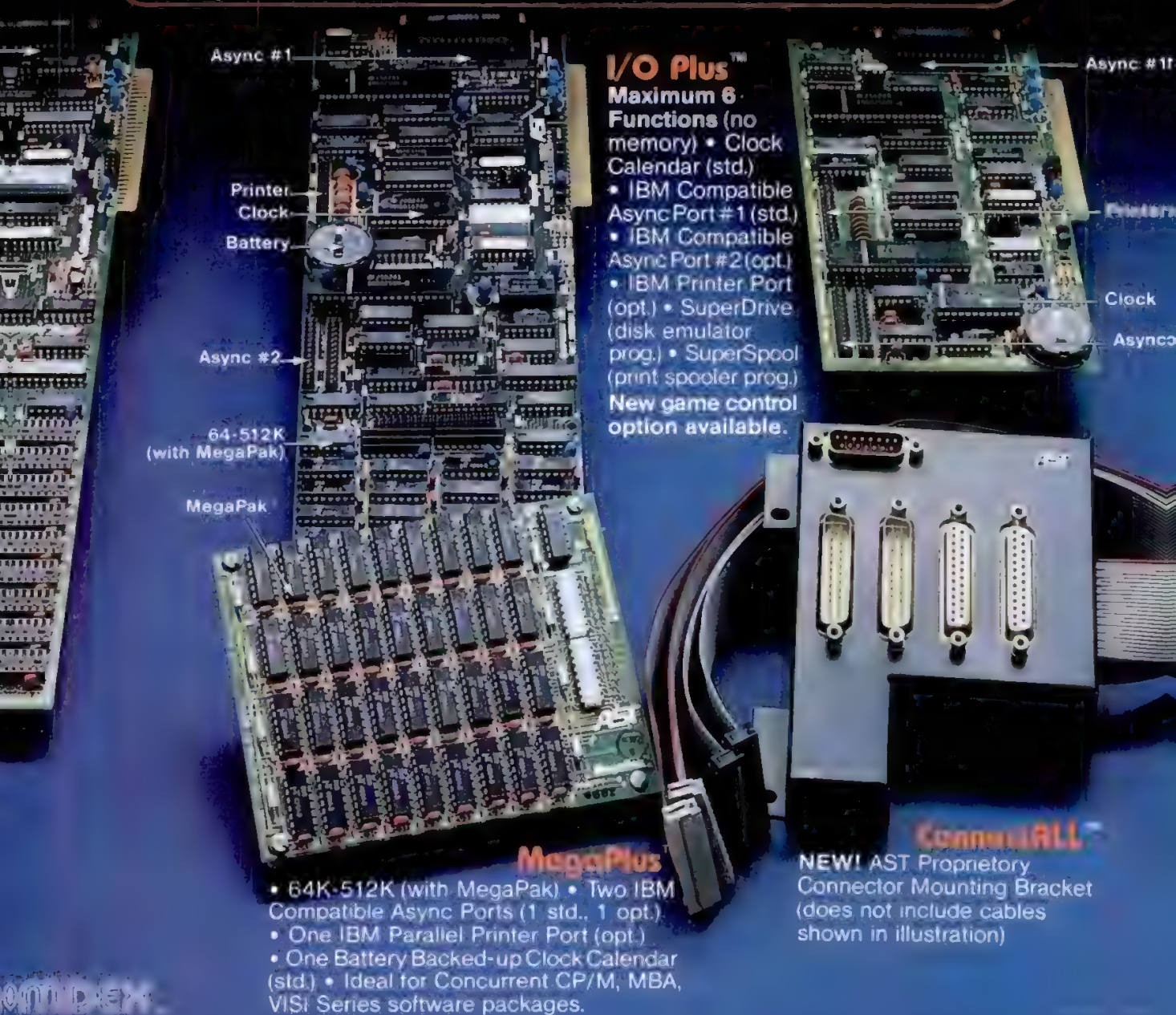
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Revised Figures

When IBM introduced the PC-XT, it also reconfigured the memory allotment—and price—of the PC.

As of March 1983, IBM stopped selling 16K PCs altogether. Its stripped down version of the PC now contains 64K RAM, which fits neatly on the motherboard, with sockets for an additional 192K, just as on the PC-XT. The new 64K very basic system will sell for \$1,355, a scant \$90 more than the old minimum configuration model.

You'll still be able to tell the difference between the PC and PC-XT motherboards. The PC version sports a cassette port, and six ROM sockets with an 8K chip snuggled into each. The PC XT lacks this port, and its two ROM sockets each hold a 32K chip. XT owners can fill eight expansion slots; even with the new motherboard the original PC accommodates only five.

—Paul Somerson

A Word Or Two With Big Blue

IBM rarely comments—"speculates"—on coming attractions but is usually willing to discuss new products.

The following is an excerpt from a PC interview with Douglas R. LeGrande, held March 8, 1983 in New York. LeGrande is IBM Assistant General Manager for Operations, Entry Systems Business Unit, Systems Product Division in Boca Raton, Florida.

PC: Twenty-two megabytes seems like a lot of storage for one user. When is there going to be a way for more than one user to get at that storage?

LeGrande: It is our belief that as people find more and better uses for the storage available, they will begin to find that they will be able to use the storage in a very efficient way. As for what will happen in the future, I prefer not to speculate on unannounced things.

PC: Why the price cuts on the original Personal Computer line?

LeGrande: First of all, we have experienced some improvements in our cost structure and we want to pass along those savings to our users. We feel that we will maintain our position in the marketplace and be able to meet the customer demands over time. One of the things this reflects itself in is being competitive in our prices.

PC: A number of vendors are offering database management systems for the PC. Are you planning to introduce one of your own?

LeGrande: I won't speculate on unannounced things in this session.

PC: Is there a separate controller for the hard disk that hard disks manufactured by other companies can plug into? And, you seem to focus on telecommunications, but you use someone else's modem. Is IBM coming up with its own?

LeGrande: The ability to attach into this

unit by other manufacturers is the responsibility of other manufacturers. There is a separate controller, but it would be their responsibility to make sure that there's a compatible interface. As for the second question, again you are asking me to speculate on a future product announcement, and I would prefer not to do that."

PC: I want to be clear on whether or not existing PCs can be upgraded to the same level as the XT.

LeGrande: The maximum amount of computer internal memory that's available is 640K in both the PC and the PC-XT. You can put hard files and two 360 KJ floppies on both units. The difference that will come up will be, for example, in the power supply, on the main systems unit, on the number of expansion slots and on whether or not you want to add the asynchronous communications adapter or some of the other optional features [to the PC]. In terms of storage capacity, you can go from the PC up to the same amount of storage capacity as exists in the XT.

PC: "You're not offering a way to add the hard disk into the systems unit on the PC?"

LeGrande: "No. You add the expansion unit. That's where both hard files would go on the PC. When you add the expansion unit to the XT you move the hard file to the expansion unit, put both floppies into the XT and you also end up with more slots for optional features."

Tandon disk drives. The CDC drive is physically similar, with two apparent differences: inclusion of an IBM logo on the black plastic front and a slightly different loading gate apparatus.

A Techni-Colorful Achievement

IBM's new Color Display drew many oohs and aahs from the nontechnical crowd. Its high-resolution 12½-inch (diagonal) screen uses black masking for high contrast and direct drive RGB technology for colors. Top resolution is 640 by 200 pixels.

The display, which will sell for \$680 at IBM Product Centers, can plug into the hooded outlet on the back of the PC-XT or the PC. It can produce 16 pure colors, including brown, light gray, dark gray and pristine white, four shades rarely seen on

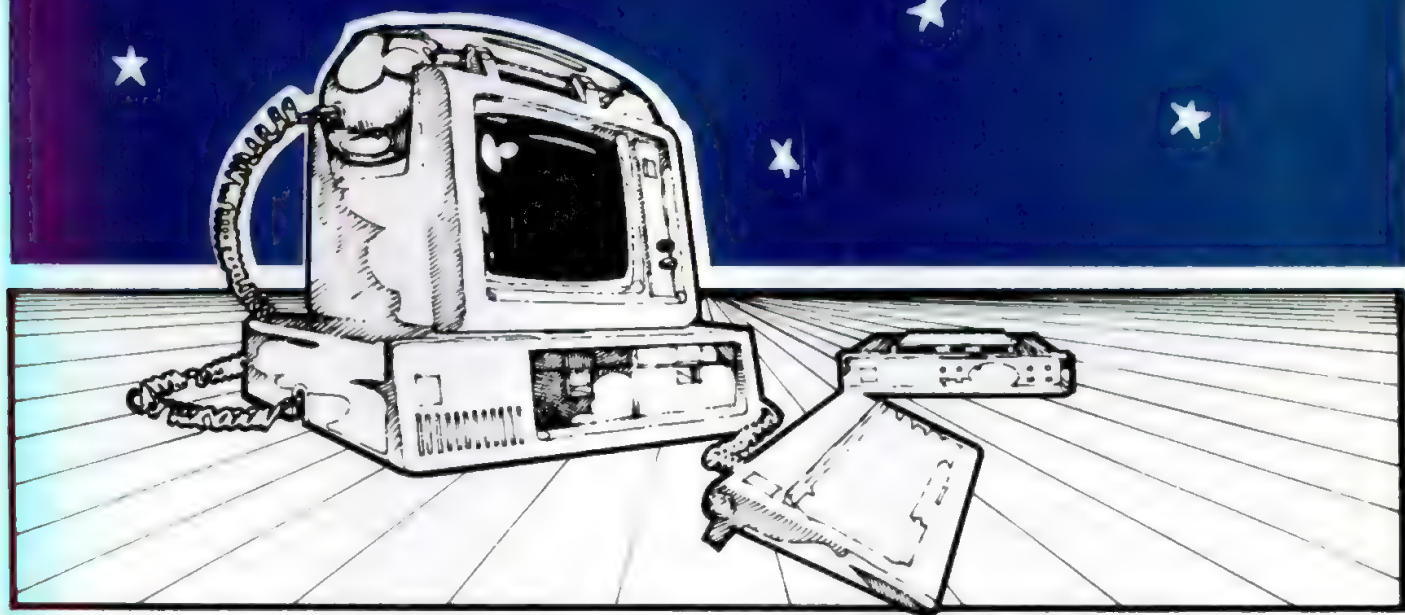
THE COLOR unit is made for IBM by an unidentified manufacturer in Taiwan.

other "16-color" monitors. On the front of the display are brightness and contrast controls and an on/off switch. The unit is very similar in appearance to IBM's monochrome display, although slightly larger. Like the monochrome monitor, the color unit is made for IBM by a unidentified manufacturer in Taiwan.

For a technical review of the PC-XT see "Inside The PC-XT" in this issue. A final assessment—if such a thing is ever really possible—is months, perhaps years away. It's already clear, however, that the PC-XT will not replace the PC. In fact, the new 3278 "black box" interface (see "A PC In Terminal Clothing" in this issue) requires not the PC-XT, but the PC. IBM is not abandoning the PC. Before long, perhaps by fall, we'll know how the market, which is to say, buyers and manufacturers—especially software manufacturers—respond. By then, last month's news may be old stuff. Our attention may have turned to other goodies, peanuts and popcorn, to name a couple.

/P

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There it was, a shiny new IBM PC-XT, fresh from its press introduction in New York. Sitting next to it was a red toolbox, and my job was to delve into its innards, in order to evaluate the technical changes. Momentarily daunted by the pristine newness of the machine, I took just a moment to admire the new color monitor. Before many more minutes had passed, the machine was in pieces on the table, at least some of its secrets laid bare.

Pundits and prognosticators have been second-guessing the introduction of this mystery machine for months. Many anticipated the much discussed "Peanut" or "Popcorn"—or even the rumored "PC II." The newest addition to IBM's family of Personal Computer products turned out to be none of these. In fact, the XT is more notable for what wasn't changed than for what was. Its central processing unit (CPU) is still an 8088 running at 4.77 MHz. So much for the predictions of higher clock speeds and an 80186 processor. The large scale integration (LSI) support circuits on the system board remain un-

changed. There is no battery-backed-up clock as some had predicted.

The most obvious change is the number of expansion slots—eight instead of the limiting five. Two of them, tucked as they are behind floppy Drive A, have room for only "shortie" boards like the asynchronous communications adapter. Slot 8 has one other change: it "expects" (IBM's word) that the board plugged into it will respond with the "card-selected" bus signal when the board is selected. Only boards meeting this condition will work in slot 8. This is not a requirement of the other seven slots. The bus drivers can handle up to 16 low-power Schottky (LS) loads, two per board. Since nearly everyone is using LS TTL logic chips these days, there is little chance of overloading the bus. You do not have to worry about overloading the power supply, as it is upgraded to 130 watts, double the PC rating.

Some obvious changes have been made to other areas of the system board. The row of ROM chips that contained BASIC is gone, replaced by a single chip. Sitting

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next to it is another chip that contains the BASIC input/output system (BIOS). The two ROM sockets can handle either 8K by 8K or 32K by 8K chips, for a total of 64K ROM. In this case, BASIC is in a 32K chip and the BIOS is in an 8K chip. Maybe it's too obvious a question, but why didn't IBM put BASICA and the BIOS in a second 32K chip and make it the default BASIC? The best news about the system board,

THE BEST NEWS about the system board is the use of 64K dynamic RAMs instead of the previous 16K chips.

however, is the use of 64K dynamic RAMs instead of the previous 16K chips. Many felt that the PC should have been designed with these chips in the first place, but they're here now and they're great. 256K capacity on the main board is part of what the XT is all about—eXTended capability. Few will miss the cassette port, which has been eliminated in the PC-XT.

A Fix on the Disks

Moving to the floppy disk, our sample machine was equipped with a Control Data Corporation (CDC) dual-sided drive, giving 320K storage per disk. Why didn't IBM use one of the proven 96 track-per-inch drives like CDC's 9490T, which would give 700K usable space per disk? Only IBM knows. . . . Don't get me wrong, 320K storage is swell, but this configuration requires 30 or so floppies to back up a fully-loaded "fixed" disk, as IBM calls its version of the Winchester.

Speaking of the fixed disk, our XT had a Seagate 10-megabyte drive. It's known to be a rugged unit; I liked the sticker that cautions you against subjecting it to greater than 20 G shocks. IBM's Hardware Maintenance and Service Manual describes a "type 1" and a "type 2" hard disk; IBM has clearly made provisions to second source the hard disk.

A Winchester disk drive is only as good as its controller, and IBM's controller

looks as good as anyone could wish. It has its own on-board microprocessor and enough memory to buffer a sector from the hard disk. It uses the system board's direct memory access (DMA) capability to transfer data to and from main memory. It relies on one of the interrupt levels to maintain a high speed. There is some innovative technology on this card, as evidenced by the "Patents Pending" legend etched onto the circuit board. It features 11-bit burst error detection and 32-bit error checking and correction. Like the 9-bit wide main memory, the emphasis is on minimizing the chance for errors. All in all, it is designed to use the 8088 as little as possible, keeping program throughput high. You won't have to wait long to play your favorite game in Advanced Basic. BASICA loaded from the fixed disk in 0.8 seconds, fast enough for most applications. Peachtext loaded from the hard disk in 2.3 seconds.

Signals from IBM

PCs have been snapped up by the business community at an awesome rate, but the XT is what business people really needed all along. No executive should have to play the floppy disk shuffle. I, for one, object to any machine that cannot think as fast as I can. And this is exactly what happens in the floppy disk environment when the program you're using goes out to disk for another overlay before it carries out your latest instruction. The pause breaks your concentration, makes you wonder if you pressed the right key, and perhaps causes you to lose a critical thought. Hard disks obviate these objections by responding many times faster (and silently) to your commands. The XT is much closer to being a professional's personal work station than the PC ever was. Now that the hard disk is available as an IBM-integrated package, the popularity of this machine is assured.

IBM has signaled this new role loud and clear with the introduction of the serial data link control (SDLC) Adapter board. This is the board that puts the PC, with appropriate software, on-line to IBM's mainframes. SDLC reflects IBM's opinion of how synchronous communications should be handled. It is implemented on this board with the Intel 8273 SDLC controller. Telecommunications engineers are usually a staid lot, but they tend to wax eloquent over devices like the 8273. It is

really a dedicated microprocessor that specializes in synchronous data communications. Again, this frees the PC CPU from onerous tasks such as monitoring the communications line for a variety of handshaking signals, block control characters, and other details. In addition, the board holds an 8255 PPI chip, which provides full control over the modem. It provides for data rates up to 9600 baud.

The Hardware Maintenance and Service Manual, like the rest of the documentation, is superb. It covers every conceivable failure the XT is likely (or unlikely) to encounter. It is organized into flowcharts and decision trees that take you from each test and error message to the proper diagnostic action necessary to isolate the fault. The sum total of special equipment required is a volt/ohm meter and an IC puller. Repairs are oriented to replacement of sub-units rather than troubleshooting the logic.

The color monitor accepts red-green-blue (RGB) inputs for maximum resolution. Its resolution is sufficient to display 25 lines of 80 characters. IBM is

REPAIRS ARE oriented to replacement of sub-units rather than troubleshooting the logic.

touting it as good enough for word processing, but the resolution is still inferior to that of the monochrome monitor. It is especially irritating in the default white on black. You can see the shadow mask in the white characters. Editing in one of the colors is far easier on the eyes. You do have to patch your text editor to output the instruction for the color you desire. Other than that, the color performance is excellent.

In conclusion, the PC-XT is just what the original PC should have been: an affordable full-capability business computer with (nearly) state-of-the-art technology. /PC

Bill Machrone is a New York City computer consultant and technical writer.

IBM's new disk operating system supports PC-XT hardware features and delivers pipes, filters, and trees to everybody.

DOS

Marches
On

A change in the operating system version number to the left of the decimal point is supposed to be a big deal. And DOS 2.0 is indeed a big deal. You can tell how big by just looking at it: the manual is fairly bursting out of its ring binder. However, you probably won't have to read the whole manual. Much of it is devoted to fairly advanced programming information, and what IBM calls "minor operational and technical differences from previous versions of DOS."

Documentation

If you do decide to lay your \$60 down for DOS 2.0, what will you get? First, the manual features a new Chapter 3 (called "Using DOS") that covers elementary operations such as working with disks, obtaining directories, displaying file contents, changing a file name, removing a file, and adjusting the video display

onscreen. Richly illustrated and clearly written, it serves as an excellent introduction to the basics. Though much of its content is borrowed from the original Chapter 3 of the *Guide to Operations*, this useful information is now more digestible and better integrated into the beginner's learning process.

New Features

DOS 2.0 arrives on two single-sided double-density disks and features a nine-sector disk format, which increases data capacity by about 20 percent. Format incompatibility is not a problem since the new DOS can recognize and read the old eight-sector format. Other new features include a configuration file, multiple disk buffers, and extended screen and keyboard control. Other companies will no doubt soon begin designing software that will take full advantage of these

capabilities.

Other special features include the Print and Graphics commands. Print is an onboard print spooler that allows you to print a list of files while doing other things with your PC simultaneously. The Graphics command allows you to copy a graphics image from the screen to your printer. This works well with both the IBM printer and the Epson line of printers, providing shaded renditions of anything you can get to the screen, including colored pie charts.

Hard Disk Support

DOS 2.0 offers considerable support for disk drives. Although the literature mentions that it is specifically suited for the IBM, the DOS 2.0 system features facilities and hooks that can support hard/cartridge disks of all shapes and sizes. Disks no longer have to patch themselves into



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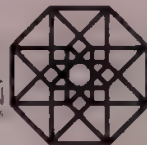
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Figure 1: A sample tree-structure directory. The backslash (\) is used to denote the root directory of the tree. (It's at the top; by convention, trees are drawn upside down.) Circles represent directories, and the lines connect each directory with its contents—files and other directories.

To lead DOS to a particular directory, you show it the "path" from root to destination, using the CHDIR (CHange to DIRectory) command. In a sequence, directory names are separated by backslashes. For example, if you want to get down to Midwest sales, you type CHDIR\marketing\sales\midwest. Now you can deal with Jones, Smith, etc., in the same manner as in earlier DOS versions.

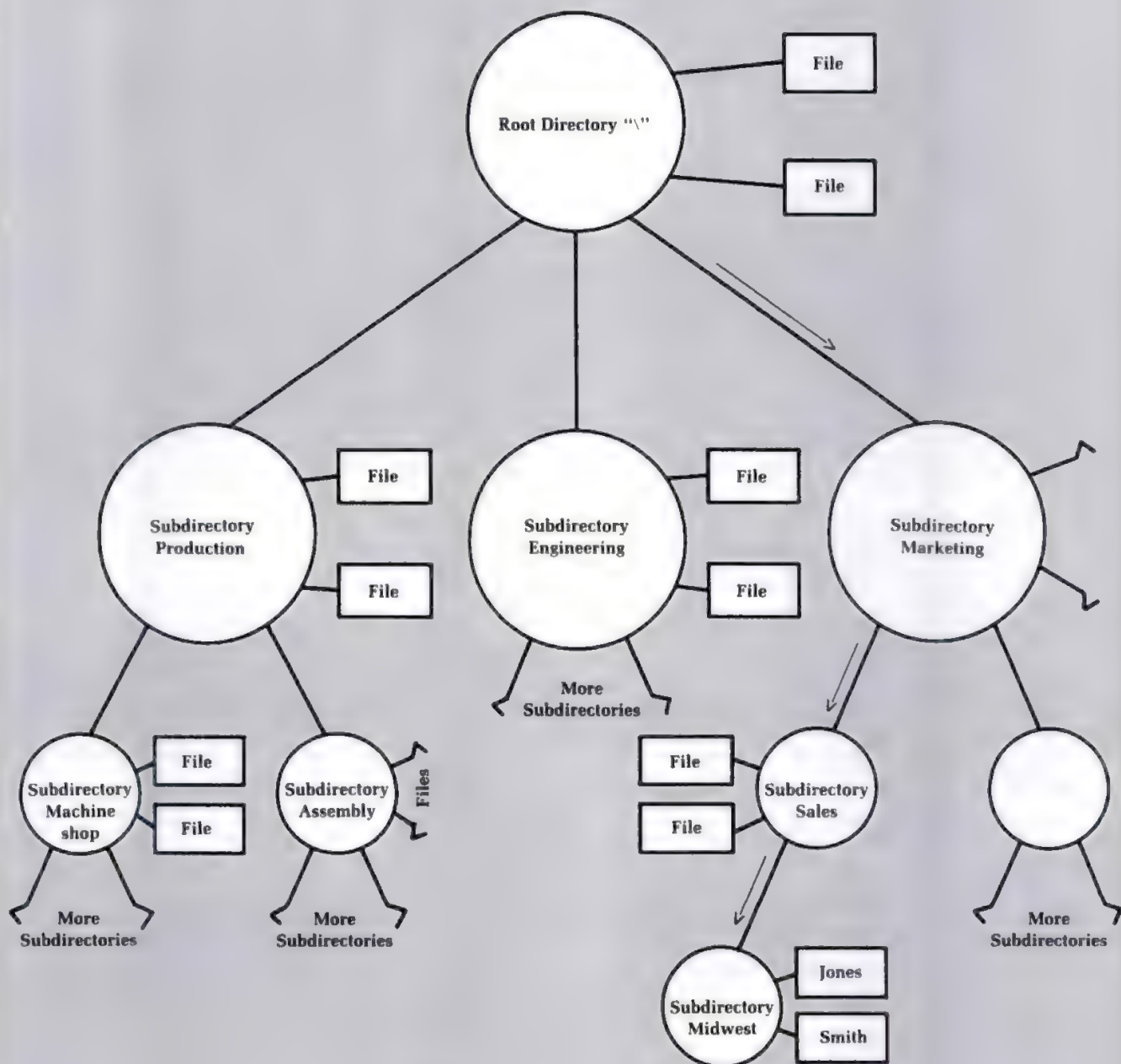


Figure 2: New DOS commands that control tree-structure directories

SYNTAX	EXPLANATION
MKDIR path	Make (create) a new subdirectory within the current directory
CHDIR path	CHange to a new Directory (This command leads DOS down the <u>path</u> to the directory you desire.)
RMDIR path	Remove (erase) the specified directory, including all of its files, subdirectories, and files in the subdirectories
TREE volume [·F]	Give a report on the tree structure (and files) of the specified volume
PATH path1; path	Tells DOS where to look for commands, batch files, etc., if they cannot be found in the current directory

the system; they can now serve as legitimate assigned devices. This means that your RAM disk will not interfere with your hard disk. In the future, this may mean that as soon as new devices are invented and marketed, they can be smoothly integrated with your system.

To install a hard disk, you use the FDISK facility. It allows you to partition the disk into separate areas, several of which are reserved for DOS, and several that are reserved for CP/M or other operating systems. You can then switch back and forth among these as you wish. At almost any time, you can change partitioning to suit changing conditions.

Backup, Restore, and Assign

Two new utility commands, Backup and Restore, work together to simplify file copying. Backup allows you to copy selected files from a hard disk to a backup

specified date. Restore, the counterpart of Backup, allows you to restore the contents of the hard disk from the disk produced by Backup. The Assign command allows you to tell the system to treat one drive as if it were another temporarily. This makes it possible to move overlaid programs to a fixed disk. Although the system will still try to retrieve the overlays from drive A, DOS 2.0 will jump to the right place.

Volume Labels

Haven't you wished that your disks could have their own computer-readable labels in addition to the stick-on kind that you use to help sort your stacks of accumulated disks? DOS 2.0 makes this possible. Using the Format command, you can give each disk a volume label. A supplementary command (VOL) can also be used to list the volume labels given to your disks.

The idea of volume is not restricted to floppy disks; fixed disks can have volume labels too. In fact, in this article, I will not talk about floppy disks and fixed disks separately. Instead, I'll refer only to "volumes," disregarding details of the medium. Hidden in this seemingly innocuous abstraction is the seed of an idea central to all modern operating systems: the "virtual" file—one whose storage medium is irrelevant to the user and to the application.

Tree-Structure Directories

Most of us seem naturally inclined to assign things to groups or classes and organize them into hierarchies. The family tree and the corporate organization chart are examples. Big problems such as organizing a business or an engineering project—or a hard disk with 1,000 files on it—demand this kind of thinking.

One of the most interesting and useful

features of DOS 2.0 is its ability to create a tree-structure organization in which the files are arranged in hierarchies of directories and subdirectories. Instead of having only one directory per volume, you can create a separate subdirectory for each successive file. Figure 1 illustrates this procedure and shows why the word "tree" is appropriate.

Planting the Tree

If the trunk, limbs, branches, and twigs of a tree were labeled, you could follow any path from root to leaf by taking the correct turn at each fork. In the tree structure, every directory has a label, and you name successive ones as you lead DOS along the path to the one you want. Once there, you can deal with the files in the

IF THE TRUNK, limbs, branches, and twigs of a tree were labeled, you could follow any path from root to leaf by taking the correct turn at each fork.

disk. With this command, you can back up a specific file, a directory of files, (plus all its subdirectories), files modified since the last backup, or files written since a

DOS 2.0
arrives on two single-sided double-density disks and features a nine-sector disk format, which increases data capacity by about 20 percent.

subdirectory as if they were the only existing ones. Creating new file names is a trouble-free procedure since they need only be unique within specific sub-directories. In this way, you can use simple, logical names instead of the complex names that would normally be required to distinguish one file from among several hundred. Although each file has a long name—the whole path to its subdirectory plus its local name—once you reach the subdirectory all you have to worry about is the local filename. Figure 2 lists the new DOS 2.0 commands that deal with the tree of directories. Using these commands, you can make (MKDIR) a new subdirectory within the one you're presently in, remove (RMDIR) an old directory (delete the directory and all its subs), change to (CHDIR)—meaning move to—a new directory, or ask for a report (TREE) on the

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tree structure of a given volume.

Another advantage of tree-structure directories is that they allow you to keep a greater number of files on a disk; this makes it difficult to run out of directory space.

The major disadvantage of tree-structure directories is that they cannot be treated the same as other files. Under DOS 2.0, you cannot Rename or Copy a directory.

Paths

Let's take a look at a related command, and one of my favorites: Path. I constantly forget what file is in which drive. Consequently I'm always getting the hated "Bad

***R**ECOVER reads a given file sector by sector, reconstructing the good sectors and skipping over the bad ones.*

command or file name" message. The Path command allows me to give DOS 2.0 a list of alternate directories in which to look for commands or files.

File-Oriented Utilities

DOS 2.0 features two file-oriented utilities, RECOVER and COMP. RECOVER reads a given file sector by sector, reconstructing the good sectors and skipping over the bad ones. Although you may lose some sectors, you won't lose the entire file.

The COMP utility, however, is a big disappointment. Instead of listing the differences line by line between a pair of ASCII files, it only reports that the files are different sizes—information you've already obtained from a DIRectory listing. If the files being compared are identical in size, COMP will report the Hex offsets to Hex differences between them. Since it doesn't try to resynchronize the files after a difference, just one byte added to one of the files will disrupt the entire procedure. Fortunately, COMP will stop after ten mismatches. It seems that COMP is only use-

Figure 3: A list of new batch statements used in DOS 2.0

SYNTAX	EXPLANATION
arguments (%1, %2, etc.) ECHO [ON OFF] ... FOR %% variable IN (set) DO command	Same as in DOS 1.1 Suppresses or allows screen messages Causes DOS to execute <u>command</u> over and over for each value of %% variable listed in <u>set</u> (between the parentheses) Tells DOS to execute the command on the line after : <u>label</u>
GOTO <u>label</u>	Tells DOS to execute the command on the line after : <u>label</u>
IF [NOT] <u>condition</u> <u>command</u>	Tells DOS to execute <u>command</u> only if <u>condition</u> is [not] true; otherwise ignore the command
: <u>label</u> <u>condition</u>	The destination of a GOTO (1) An ERRORLEVEL = <u>number</u> ; returned from BACKUP or RESTORE (2) A string comparison, i.e. <u>string 1</u> == <u>string 2</u> (3) An inquiry: EXIST <u>filename</u> , as to whether <u>filename</u> is defined in the current directory
SHIFT	Allows a batch to have arguments beyond %9

ful for verifying copies of files, a function already accomplished by /V in Copy.

The EDLIN Editor

EDLIN is the beneficiary of some significant improvements in its new release on DOS 2.0. It features three new commands, all related to blocks of text. The Copy command allows you to duplicate a block of lines as many times as you wish and in whatever location you desire in the edit file. The Move command allows you to move a block from one place to another in the edit file. The third command, Transfer, allows you to read the contents of a file into the edit file at a chosen point. Unfortunately, Transfer cannot be used to perform the reverse, to write a chosen block out to a file.

Batch Files

One of the most important ideas in computing is that the user, in performing a task on the computer, should be spared as many of the details as possible. Most of the work should be accomplished by a task force of utilities, notably batch files. Their name suggests their main purpose, which is to batch together DOS commands to be executed collectively. In DOS 1.1, a batch file is limited to a list of DOS statements to be executed in strict sequence. In DOS 2.0, its range has been expanded to include statements that label blocks of commands, choose blocks of commands based on certain conditions, and reiterate commands over sets of variable values. Figure 3 lists the specific statements used. These new statements give you power to

write batch programs that will do almost anything you wish.

If you are an applications-oriented user, you might not appreciate this feature since you probably don't want to write any programs. You might benefit, however, if software companies begin to take advantage of this upgraded facility. In time, they may be able to create batch files that will make it easier for you to install their products and more convenient for you to run them.

Standard Input and Output

The two principal channels of communication between you and your programs are the keyboard (standard input) and the video display (standard output). It is helpful, however, to think of these two more

***E**DLIN IS the beneficiary of some significant improvements in its new release on DOS 2.0.*

abstractly—as virtual devices—the keyboard as "Stdin," the video as "Stdout." Any program that receives most of its instructions and data from Stdin, and sends most of its results to Stdout, can be used as a building block with others that operate in the same manner. The Stdout of

one program can be transformed into the Stdin of the next, and so on, until these smaller modules eventually form one large program. The concept of flexible I/O is the foundation of two more complex procedures: redirection and pipes.

Redirection of Standard I/O

Actually, you've been practicing redirection all along without ever giving it much thought. You redirect output each time you press **PrtSc** or **Ctrl-PrtSc**; the former redirects a snapshot of Stdout to the printer, and the latter redirects all of Stdout to the printer one line at a time.

In DOS 1.1, the **Mode** command gives you the option to redirect all printer output from a program to the asynchronous adapter. By connecting the pipe out of **PrtSc** to the pipe set up by the **Mode** command, any output sent to the screen goes on your asynch line—resulting in simple, extemporaneous telecommunications.

In DOS 2.0, the redirection of standard input and standard output has been made a general principal of operation. The redirection feature allows almost any program to receive its input from a source other than the keyboard and to direct its output to a destination other than the screen. Sources and destinations can be files of your choice or any of the standard character devices, such as **CON:**, **AUX:**, **COM1:** or **COM2:**, **PRN:** or **LPT1:**, **LPT2:** or **LPT3:**, or **NUL:**. Using DOS 2.0, you can redirect

IN DOS 2.0, THE redirection of standard input and standard output has been made a general principal of operation.

the contents of a file as canned input to a program that would otherwise require you to type in the contents of that file. You can also redirect the results of a **tree** command to a file and edit those results to produce a permanent annotated catalog of a volume's contents at the end of a project.

Redirection is a big step toward making your PC into a virtual worktable at which

you can do anything you want to any text or image you can create or otherwise acquire.

Pipes

In my opinion, the distinction between redirected standard input/output (I/O) and pipes is unnecessary and obscures the fundamental issue: that any program or device should be able to communicate with any other program or device without undue concern for the medium used. Nevertheless, in DOS 2.0, the distinction exists; you redirect standard I/O to files and devices, but you pipe standard I/O among programs. The result is the same either way.

Using DOS 2.0, you can pipe the Stdout of one program into the Stdin of another and run them in tandem to accomplish some larger task. This allows you to look at programs as tools and to look at a set of programs as a tool box. You choose the proper tools and use them together in the way that will best accomplish the work at hand. DOS 2.0 brings you another step closer to the virtual worktable; it allows you to transfer information to a drawer full of virtual tools.

Filters

A program that has been specially designed to work with redirection and pipes is called a filter. The term comes from electronics or plumbing; a filter refers to something that creates a desired change to a stream when it passes through the filter. In the same way, a filter program changes the stream of data that passes through it. It reads data from Stdin, changes it in some way, and writes the results to Stdout. Filters usually perform only one elementary operation on the data stream. Combined filters are required to effect significant change in the stream.

If we go back to the idea of the virtual worktable, Stdin and Stdout are the work surface; redirection and pipes control the stream of data; and filters are the tools in the drawer. IBM has provided a "starter set" of filters in DOS 2.0. These are called **Sort**, **Find**, and **More**.

Sort, Find, More

Sorting is commonly used to organize information. If you can arrange to pipe a data stream to the **Sort** filter, you can sort it without writing a special program. **Sort** reads a data stream from Stdin, sorts it on

the requested field, and writes the result to Stdout. For example, suppose you want to produce a time-sorted catalog of the files in a disk volume. You would pipe the **DIRECTORY** report to the **Sort** filter and redirect the result to the printer or to a file.

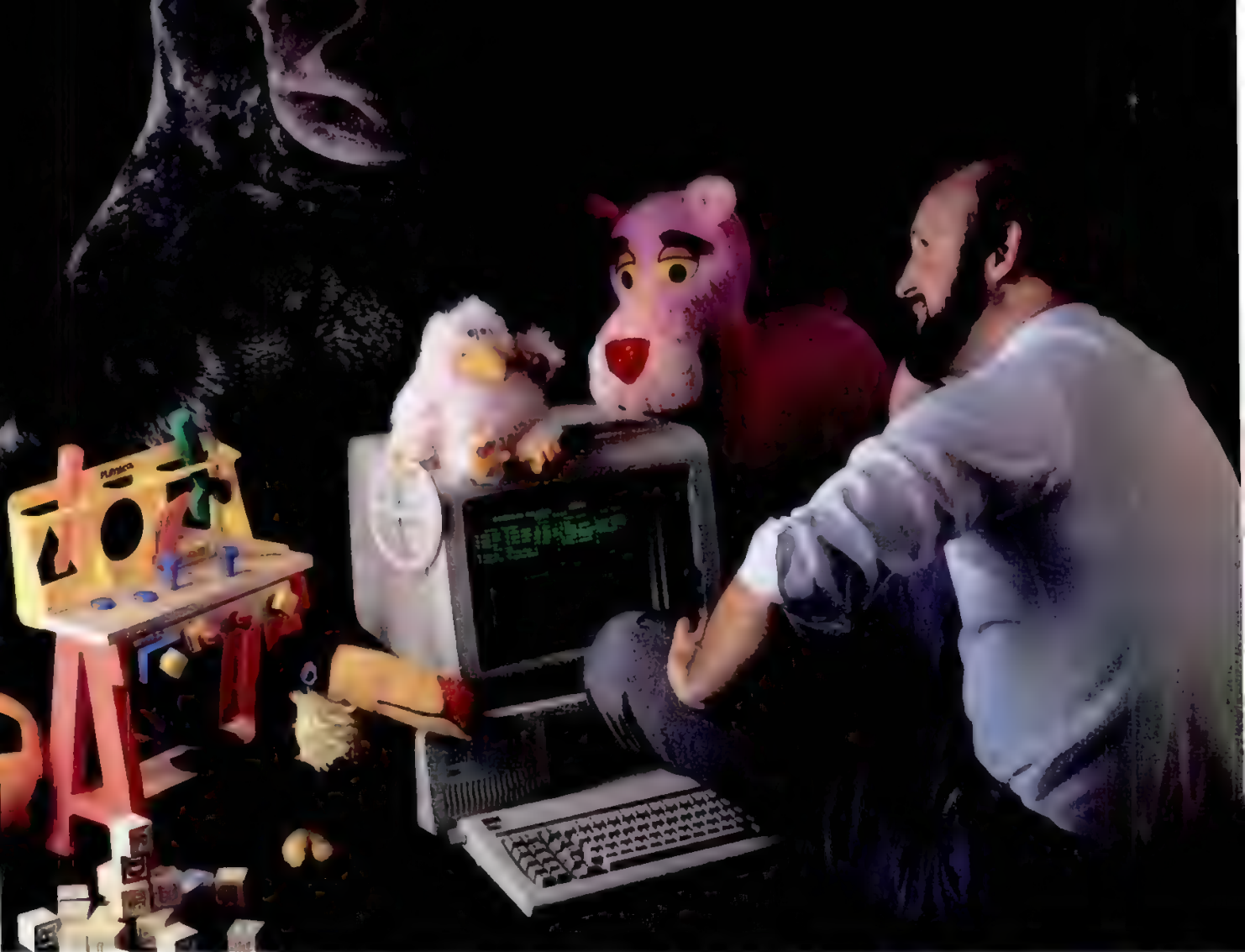
Suppose you have a number of text files, each a chapter in a large report or

IF YOU CAN arrange to pipe a data stream to the Sort filter, you can sort it without writing a special program.

book you're writing. You want to find every reference to a table or figure so that you can verify them with the art department. Although you could load each file into your word processor and do a global search, this would involve tedious, repetitive work with a great deal of overhead. If you use the **Find** filter, however, your work will be much easier. **Find** searches a sequence of files for a given string value and reports the results to standard output with minimum effort. It will then filter standard input, reporting each line that contains a specified string to standard output.

Suppose you want to produce a quick date-sorted report that will list the purchase orders for Acme Trucking. To accomplish this, you could run **Find** on a set of files containing purchase orders to filter for those belonging to Acme Trucking, pipe the result to **Sort**, then redirect to a file.

When DOS 1.1 added the **/P** option on the **DIRECTORY** command, I immediately tried the same option on **Type** to see if it would work there, too. It didn't, since the facility wasn't general. DOS 2.0, however, features the **More** filter, which reads data from Stdin and sends one screenful at a time to Stdout—presumably the screen. **More** is certainly not an exciting feature, but it is useful. For example, if you want to preview the Acme Trucking report before printing, you can run the file through **More** to see it a page at a time without key-



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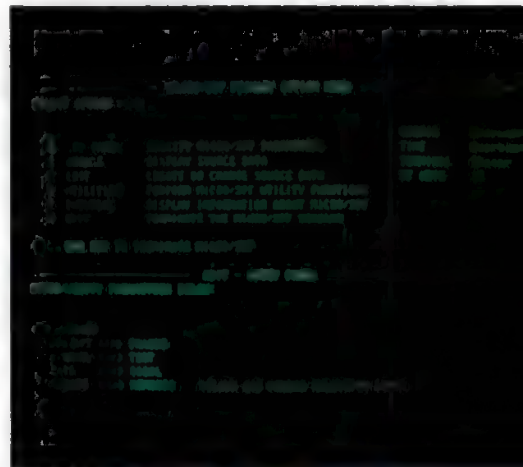
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ing in Ctrl-NumLock to stop the screen from scrolling.

It seems that these three filters are only the beginning. Soon, IBM and independent companies will undoubtedly be eager to market filters for simple calculating, sorting and merging, text-pattern recognition, formatting, plotting, business

THE CTTY command allows you to connect a foreign terminal to the PC, giving it the identity of standard input and output for redirection.

graphics, macro processing, and more. Your drawer of tools will probably grow to suit your personal needs.

New Screen Facilities

DOS 2.0 features several new facilities that can help make your video screen more flexible: CLS, ECHO, and PROMPT. All three are DOS commands that you can invoke from the normal DOS prompt.

CLS allows you to clear the screen at the DOS prompt. Although this doesn't seem like much, think about it. How many times have you wanted to get rid of clutter? Or rest your eyes by moving off that bottom line on which DOS always seems to settle? Or zap some incriminating material when someone starts peering over your shoulder?

ECHO seems especially useful for system integrators; it can keep irrelevant DOS messages from appearing on the screen. When a batch file is used to automate a procedure, you may find it difficult to determine which of the messages appearing on the screen is meant for you. ECHO permits you, the batch author, to control what goes to the screen so that the user sees only the messages intended for him.

The DOS prompt that tells you the current default drive has always been either A>, B>, or C>. In DOS 2.0, the Prompt command allows you to substitute other

things, such as the time or date, for the drive letter or for the > symbol. Substituting the current default directory—option P (for path)—causes the prompt to display the actual path to the current directory. This is very helpful when you're learning to use tree-structure directories since you will always be able to tell where you are in the tree.

New Keyboard Facilities

The Ctrl-Break key allows you to abort a program; however, since it is only tested at certain points during a program's tenure, some programs (mostly compilers) could not be aborted because those points were never reached. The Break On command in DOS 2.0 increases the chances that an abort will take place by telling DOS to check Ctrl-Break at more frequent intervals.

The CTTY command allows you to connect a foreign terminal to the PC, giving it the identity of standard input and standard output for redirection. This seems to be another indication that DOS is growing up and becoming less parochial about attachments.

ANSI Escape Sequences

The American National Standards Institute (ANSI) has published specifications for a set of standardized escape sequences that programs can use to control virtual keyboards and screens (Stdin and Stdout). These sequences serve as a programmer's tools, helping him to create more portable software by treating devices as abstractions and leaving the details of specific devices to the operating system.

DOS 2.0 has adopted some of these escape sequences. Standard output (the screen) will now accept them to position and move the cursor, set video attributes, and erase all or part of the screen. Standard input (the keyboard) will accept escape sequences to map the keys to different characters or to character strings. It seems that 10 to 15 different keys can be remapped, each to a 10-character string, and that more keys can be remapped if the strings are shorter. I found it difficult to determine, however, because when I tried to use this procedure, the system failed. This seems to be the weakest feature of DOS 2.0.

Programming Facilities

Debug has been improved substantial-

ly by the addition of a conversational assembler. Although it can't deal with labels and symbolic names, it certainly can handle a MOV DX, [BX+SI] faster than you probably can! The Link program, however, is a big disappointment. There is still no way to obtain a useful Map of a complicated multi-object program, and there is still no library manager.

The DOS 2.0 manual, however, does tell you how to port your compilers over to hard disk. This procedure, which appears to be thoroughly documented, requires various patches. Since compilers are large and produce large intermediate files, this should be a significant operational convenience. It does not speed up compilation or assembly, though, because compilers are compute bound, not I/O bound.

Device Drivers

Perhaps the most important internal change in DOS 2.0 is its ability to install devices into DOS in a systematic, disciplined manner. (Chapter 14 of the DOS 2.0 manual provides a thorough explanation of how to build device drivers and install them.) The CONFIG.SYS file is the key to setting up a hardware configuration at boot time. Using this file and a device driver, attachment manufacturers can integrate their devices into the system easily, circumventing the free-for-all atmosphere that existed previously. In my opinion, all devices should coexist in this

DOS 2.0 FEATURES
*several new facilities
that can help make your
video screen more
flexible.*

way rather than compete for resources.

DOS Internal Function Calls

DOS 2.0 has almost doubled the repertoire of internal function calls—good news for software developers. If the developers begin to standardize their programs to suit these facilities, it could be good news for you and me too. It's much easier and more productive to use a set of programs that operate in a similar fashion and

serve as task forces, such as the filters discussed above.

Probably the most interesting feature of the new internals repertoire is its strong multi-tasking orientation. Files can now be assigned handles and treated more abstractly. Disk transfer areas can also be swapped and managed (DOS won't do this for you yet, but the elements are there for you to do it yourself). Soon, perhaps, we may actually be able to share files among active tasks.

DOS also contains internal function calls that can allocate and free memory. They can also spawn subtasks and control and monitor their operation. Appendix F and Chapter 10 of the manual even show how to invoke secondary copies of the DOS command kernel itself. This could be the start of genuine multi-tasking in the

Some users should not upgrade. If you run a 48K to 64K machine, for example, don't invest in DOS 2.0. It requires about 25K RAM and is almost certain to crowd your present programs out of memory. If you've become accustomed to a multi-function board with a clock/calendar, RAM disk, and spooler, don't rush out to buy DOS 2.0 yet. Manufacturers of attachments will probably publish updates for their interface software soon, and you should wait. If you have a hard/cartridge disk, IEEE 488 boards, or non-IBM color graphics boards, the same applies. If a program needs a DOS patch at installation, it won't run with DOS 2.0 until the manufacturer reworks the software.

Compatibility

Before you decide to buy DOS 2.0, another fact you should consider is the additional memory required by the system. (Appendix K of the manual lists the IBM software products and their memory requirements under DOS 2.0). Unless you have a PC-XT, you will need an auxiliary RAM card, since all of the IBM software under DOS 2.0 requires at least 96K, and most require 128K.

I tested many programs with DOS 2.0; Figure 4 displays the results. (My computer runs with 320K RAM.) I loaded and executed each program to see if I could get it to run. Since DOS 2.0 file directories are different, I also tried to perform file retrieves and saves. I can't say that my tests were rigorous and conclusive; I can only say that they were first indications.

I knew that one set of programs would fail before I even tried it. Several VisiCorp

programs, including VisiDex, VisiFile, VisiTrend, and VisiPlot share a feature that undermines their usefulness even under DOS 1.1: They load at fixed memory locations, just barely above the old DOS. Under DOS 1.1, they override most

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IBM PC. It will take time to find out.

To Buy or Not to Buy

The question arises: Should you buy DOS 2.0 or keep your DOS 1.0 or 1.1? What are the rewards or penalties of upgrading or standing still?

Figure 4: Programs that can and cannot be used under DOS 2.0.

Successful under DOS 2.0

WordStar
VolksWriter
EasyWriter 1.1
VisiCalc
SuperCalc
MutliPlan¹
TIM III
dBASE II
ProKey
KeyNote
PC-Talk
PC-File

Failed under DOS 2.0

Norton Utilities
Visidex
VisiFile
VisiTrend
VisiPlot
Select
FunKey

¹MultiPlan contravenes keyboard reassignments.

²Since Norton utilities deal intimately with the file structure of DOS, they shouldn't be expected to run after a major change.

foreign attachment codes, such as RAM disk, spooler, or keyboard macros. Under DOS 2.0, they override the operating system itself, forcing you to reboot.

Most software DOS extensions such as ProKey and KeyNote have fared well in the transition, continuing to work and save you work. Unfortunately, FunKey fails.

DOS 2.0 is temporarily incompatible with many non-IBM hardware attachments. Clock/calendars and serial and parallel ports are relatively trouble-free because they are in hardware-fixed locations. RAM disks and hard disks, however, fail consistently, but the fault is not with DOS 2.0. Since DOS 1.1 made no provision for these attachments, manufacturers were forced to patch them in, leaving them susceptible to any DOS changes. One of the best features of DOS 2.0 is that it can support some non-IBM devices. I believe that in the near future, manufacturers will gladly jump on the DOS 2.0 bandwagon, and incompatibility will become a thing of the past.

Final Impression

DOS 2.0 is a major step toward a full-service operating system. It now has many of the characteristics of a multi-processing supervisor, as well as many of the facilities needed to encourage better programming practices and to foster cooperation among programs. For me, DOS 2.0 is a very bright spot in an otherwise gray and drizzly Seattle spring. /PC

Tips on mastering BASIC 2.0, including programs to demonstrate its enhanced graphics capabilities, background music, key trapping—and more.

BASIC Keeps Pace With DOS 2.0

For several months now, PC programmers have been on tenterhooks about the supposedly astonishing versions of DOS 2.0 and BASIC 2.0 in the works. As a result of either the VisiOn and Lisa hoopla or just plain old wishful thinking, rumor had it that both DOS and BASIC would be substantially different in their latest reincarnations.

By most accounts, DOS was to be menu-driven and a kissing cousin of UNIX. You'd never again have to take a deep breath and plunge into the kind of fearsome, contorted, parameter-strewn syntaxes that peppered early operating systems. Instead, single keystrokes would flash you through hierarchical command menus, taking you where you wanted to go with a minimum of fuss. You would be able to plug every PC in America into your 8088 and run all of your computing jobs concurrently. BASIC was reputed to be bug-free and bursting with powerful new

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commands and graphics statements.

Wrong. True, the fat new DOS manual bulges with 14 chapters and 7 appendixes; you can barely turn its pages without having the rings pop open in an explosion of flying paper. In fact it's so massive and unwieldy that there are already 18 pages of corrections. But much of the increase is fairly technical information or detailed

instructions on how to use the hard disk (which IBM perversely refers to as the "fixed" disk). Commands are even more inscrutable now that there are directory trees. A simple job like copying a file under DOS 2.0 can require the chilling:

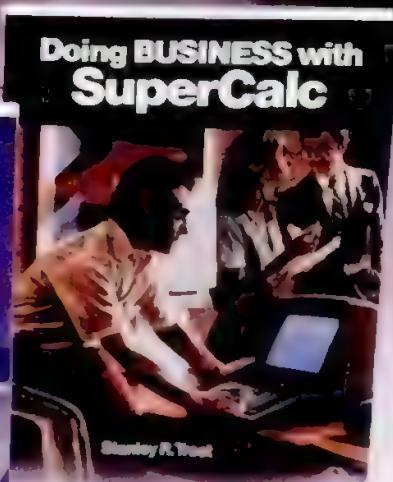
```
COPY [/A]/B[d:[path]]filename  
[.ext]/A/B+[d:[path]]filename  
[.ext]/A/B...[d:[path]]filename  
[.ext]/A/B/V
```

The old DOS manual looks like a Reader's Digest Condensed Book next to its successor. Just getting BASIC to bang up off the disk into memory can benumb your fingers with:

```
BASIC[A][filespec]<stdin>]  
[>stdout]/F:files/S:bsize]  
[C/:combuffer]/M:[max workspace]  
[, max blocksize]/D]
```

This jumble of codes shows three of the enhanced DOS features. The /D option

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(IBM calls these slash-initiated options "switches") lets you automatically calculate certain BASIC functions in double precision numbers. The /M switch allows you to load programs higher in memory than your BASIC workspace. And you can now shuttle data in and out to nonstandard I/O devices by redirecting it with <stdin and >stdout. A related feature called "piping" allows the output of one

DOS, IN FACT, *is loaded with interesting new tricks, or what IBM terms "significant functional enhancements."*

program to become the input of another so that you can, for instance, use what prints out on your screen as input. (This last refinement may delight debuggers and code unassemblers no end.) DOS also provides "filters" that can sort or search for strings in your text or display data a screen at a time. And the flexible new input/output (I/O) lets you create your own filters.

Roots at the Top

DOS, in fact, is loaded with interesting new tricks, or what IBM terms "significant functional enhancements." Since you can now stuff 22 megabytes of memory, for instance, Get and Put will let you store and locate files numbered as high as 16,777,215 (short files, no doubt). You can name your disks, throw an extra 40,960 bytes onto a double-sided floppy, clear the screen, queue and spool your printing jobs, reassign all the keys on your keyboard, prevent your batch instructions from showing up on the tube and add loops and IFs to your batch files, rescue data from disks with bad sectors, verify all your disk writes, dump a graphics screen to an Epson/IBM printer, COMPare all the files on two disks in one pass, install your own device drivers, even change the prompt from A> to "Hi there, sailor:" (or, as shown in the DOS manual, to a two-line prompt that automatically gives you the

current time and date), and, as they say in the advertising racket, "much, much more."

Some of the new material is a result of the tree-structured directories needed to put the fixed disk through its paces. A double-sided disk still gives you up to 112 files in its conventional root directory, and a single-sided disk, 64. But you can now branch off thousands of subdirectories, limited only by the space on your disk. A device called a path identifies new subdirectories and their locations, marking off intervening subdirectories up the tree toward the root directory with backslashes. (IBM's trees have their roots at the top.) Clear? Paths can be specified as well for such violent-sounding BASIC commands and statements as Kill, Chain, Bload, Open, and Run. If you haven't yet started using batch files, this keystroke-happy new DOS will turn you into a true believer.

BASIC Facts of Life

The BASIC manual has also been substantially updated. With DOS 2.0 you receive over 100 new pages to shoehorn into your BASIC manual. A hefty ten of these pages contain advice for beginners on the BASIC facts of life, and instructions for running the same tired old SAMPLES programs and IBM's COMM telecommunications program (one that few users apparently ever snoop into; see "Psst! . . . Want Communications Cheap?" PC, Volume 1 Number 9). Perhaps this section is a sign that IBM acknowledges that first-timers need all the help they can get. It would be a boon to befuddled new users everywhere if IBM were to publish an expanded version of this as a disk tutorial or a separate manual to guide the uninitiated through the intricacies of BASIC and DOS.

Two new pages in a following chapter demystify the [L]PRINT USING statement; my guess is that Boca Raton received a few thousand letters grouching about BASIC's peculiar techniques for formatting numerical output. One puzzling change is the transformation of "Joysticks" in Chapter 3 of the Table of Contents to "Joy Sticks." Is there a hidden message here?

One small bone to pick: why hasn't the set of SAMPLES programs been updated? They were weak 18 months ago; you'd think that IBM staff programmers could have whipped together some exciting

demonstrations in the interim. Crowing about the PC's much-vaunted graphics ability and then showing it off with a boring bouncing ball and a pathetic screen of random boxes self-mockingly called "The City" is a joke. Virtually everything about the PC is of first-water quality, but these uninspired demos are pure zircon.

Even more galling is that the new operating system is so large (weighing in at a disk-clogging 40K) that it and several new DOS files have bumped all the sample programs onto what amounts to a separate disk. IBM could have added new high-quality demonstrations; instead, this second disk is half empty.

Some IBM product centers have been demonstrating a graphics program with gorgeous typefaces and a large animated tail-wagging pink elephant tap dancing to the strains of "Tea for Two." And IBM staffers allude to a mysterious internal IBM-written graphics development toolbox that the company uses to knock together presentations. When will such programs be released? Companies producing PC lookalikes such as the Compaq include impressive graphics embellishments with their systems. Perhaps IBM is waiting to publish a whole new slate of graphics routines when it announces the second-generation graphics card it is rumored to be perfecting.

MY GUESS *is that Boca Raton received a few thousand letters grouching about BASIC's peculiar techniques for formatting numerical output.*

Room With a VIEW

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Figure 1: Program to illustrate selective erasing with BASIC 2.0 VIEW statement.

```

100 ' "VIEW.CLS" --- Demonstration of BASIC 2.0 viewport screen clearing
110 ' For readers of PC Magazine / Volume 1, Number 12
120 SCREEN 1:VIEW:CLS:KEY OFF
130 VIEW (1,1)-(151,160),,1
140 LINE (48,50)-(100,100),2,BF
150 VIEW (165,1)-(315,160),,2
160 LINE (48,50)-(100,100),1,BF
170 LOCATE 22,4:PRINT "Hit ";CHR$(34);"1";CHR$(34);" to clear the blue square
180 LOCATE 23,4:PRINT "Or hit ";CHR$(34);"2";CHR$(34);" to clear whole screen
190 I$=INKEY$:IF I$="" OR VAL(I$)>2 OR VAL(I$)<1 THEN 190
200 IF I$="1" THEN CLS ELSE PRINT CHR$(12)
210 LOCATE 22,4:PRINT SPC(32):LOCATE 23,1
220 PRINT "Hit ";CHR$(34);"R";CHR$(34);" to rerun or any other key to end";
230 J$=INKEY$:IF J$="" THEN 230
240 IF J$="R" OR J$="r" THEN 120 ELSE LOCATE 1,1:END

```

in the third, and then use a CLS statement, only the most recently-accessed viewport (in this case the third one) will be affected. The circle will disappear while the other two images remain on the screen. You can put borders around these mini-screens and fill them with different background colors or simply display the contents against what looks like the normal background of the main screen.

If you want to display a series of illustrations in a corner of a text-filled screen, you can use VIEW to clear off each image before the next appears without disturbing any of the surrounding prose. To do this previously you had to include extra space around each image to "blot out" the previous one, clear the specific area with a time-consuming FOR-NEXT loop, or successively redraw the entire screen.

The program listing "VIEW.CLS" in Figure 1 illustrates one of the properties of viewports. Two filled boxes are shown on the screen, each in its own WINDOW. If you hit 1, the CLS statement erases the more recently drawn image (the right-hand box); the box inside the left-hand viewport remains untouched. However, if you hit 2, the more indiscriminate Ctrl-Home statement—which you can put into your programs using PRINT CHR\$(12)—wipes the entire screen clean.

Notice that the two boxes in Figure 1 are drawn using identical (48,50)-(100,100) coordinates. Omitting the word SCREEN in a VIEW statement plots all points relative to each viewport. If you do include SCREEN, points are plotted using the absolute coordinates of the screen, as in earlier releases of BASIC.

Vanishing Lines

However, the screen displays only

those points that fall inside the viewport. This feature is called "clipping," and is a boon to graphic artists. Previously, if you drew long lines or giant circles, any parts of the image that extended past the edge of the screen bounced back (or "wrapped around") onto its surface, scribbling over your images. Now, such overly-long lines are truncated at the edges of the viewport. Anything extending beyond the border disappears, although on our spanking new IBM color monitor we could still see a thin trace of an image at the edge of its view-

smaller than the image. When the two circles are placed inside this viewport, they are scaled down—made proportionately smaller. The second VIEW program example on page 4-289e of the BASIC manual puts four viewports nicely on the screen, but contains an error. Line 2000 currently reads:

2000 LINE (45,50)-(90,75),1,8

It should read:

2000 LINE (45,50)-(90,75),1,B

The B at the end turns what would otherwise be a diagonal line into an unfilled box; trying to run this with an 8 will give you a syntax error. Curiously, the comment in 2010 refers to the image drawn by 2000 as a line, not a box. This is fairly careless of IBM; could it be that these manuals were rushed into print?

WINDOWS on the World System

A companion statement, WINDOW, takes scaling a step further by allowing such special effects as zooms and pans. WINDOW redefines the coordinates of the screen in one of two ways. Without the WINDOW statement, the screen is configured so that the upper left-hand corner is labeled (0,0) and the lower right-hand corner either (319,199) in the medium resolution SCREEN 1, or (639,199) in the high resolution SCREEN 2.

You can now use WINDOW to give the screen true Cartesian coordinates, so that point (0,0) is now dead center. By adding the SCREEN attribute to your WINDOW statement, the upper left-hand corner becomes (-1,-1) and the lower right-hand corner (1,1); omit this attribute and the upper left-hand corner of your screen is labeled (-1,1) and the lower right-hand

S
*SOME IBM
product centers have
been demonstrating a
graphics program with
gorgeous typefaces and
a large animated tail-
wagging pink elephant
tap dancing to the
strains of "Tea for
Two."*

port long after it vanished.

VIEW also lets you scale objects by placing them in small or large viewports. There's a good example of this on page 4-289d of the new BASIC manual. A short program draws intertwined circles in the middle of the screen, then creates a viewport in the upper left-hand corner that is

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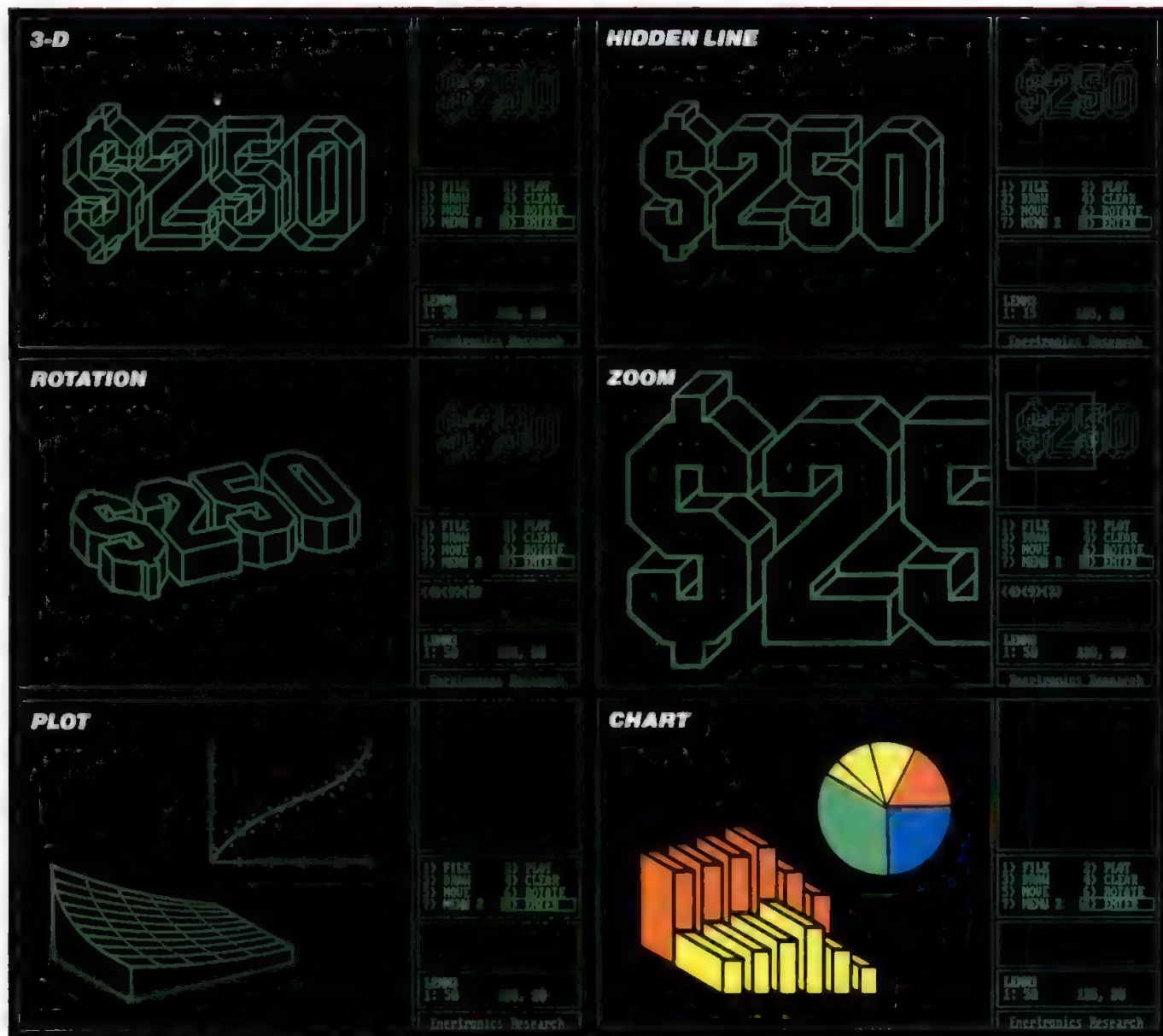
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corner (1,-1).

You can, of course, use numbers greater than 1. The coordinates you select are called "world coordinates" and allow you to draw objects that extend off the screen.

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Draw a circle with a radius of 1 foot with its imaginary center 6 inches to the left or right of your monitor and all you'll see is an arc trailing off the edge.

If the coordinates of your WINDOW are larger than those of your image, the image will appear small and floating in space. If the coordinates of the WINDOW are smaller than your image, you'll see only a part of the image. By stepping all or some of the WINDOW coordinates up or down, you can create the effect of either zooming in or out on an object or scanning across it.

WINDOW, like VIEW, will clip lines extending past its borders. So will CIRCLE, PAINT, POINT, LINE, PSET, and PRESET. CIRCLE hasn't changed a whisker. It still comes with the same set of confusing instructions, requiring an understanding of radians, negative angles, and different aspects in medium and high resolution. PSET and PRESET are similarly

unaffected by BASIC 2.0. POINT has been brought up to date and can return physical or world x- or y-coordinates on screens with or without active WINDOWS. PMAP, one of the three new BASIC 2.0 functions, translates physical coordinates to world coordinates and vice versa. This is necessary because WINDOW uses the world system; the center of its screen is (0,0). VIEW uses the physical coordinate system; the center of its medium resolution screen is (160,100).

Adding Dazzle

There's more good news—BASIC 2.0 offers several advanced graphics statements that can add dazzle to your display. The LINE statement now allows a style option that lets you draw with patterned lines rather than garden-variety solid ones. With LINE styling you can create decorative borders of dots and dashes in various combinations based on the pattern of ones and zeros in 16-bit binary numbers.

The following discussions assume a brief familiarity with binary and hexadecimal numbers. Decimal numbers use the digits 0-9; and 10 equals the number of fingers on both hands. Binary numbers use only the digits 0-1; 10 in binary is equal to the decimal number 2. Since there are 16 digits in hexadecimal notation, hex numbers use the digits 0-9 plus the letters A,B,C,D,E, and F; 10 in hex is equal to 16 in normal decimal notation. Twelve is represented as 12 in decimal, 1100 in binary, and C in hex. A straight, unbroken line would be represented in binary as:

1111111111111111

and a dotted line as:

1010101010101010

The first binary number above would be equal to 65,535 in decimal notation, or &HFFFF in hex. The second one is equal to 43,690 in decimal and &HAAAA in hex. You can create your own patterns by experimenting with arrangements of 16 ones and zeros. A series of lines each with fatter dashes would be:

1100110011001100	(&HCCCC)
1110111011101110	(&HEEEE)
1111100011111000	(&HF8F8)
1111111100000000	(&HFF00)

The patterns do not have to be as orderly as the ones above; any combination of spaces (zeros), dots (ones surrounded by zeros at either end), and dashes (groups of ones surrounded by zeros) that you can express as a 16-digit binary number will work.

To convert these cumbersome binary numbers into their hexadecimal equivalents, you can either look up the repeating pattern of ones and zeros in a new conversion chart located in Appendix H of the BASIC manual or use the simple program called "CONVERT" in Fig. 2. (This program can also be used for nongraphics applications where you need to find the decimal or hexadecimal version of any 16-digit or shorter binary number.) To create

A COMPANION
statement, WINDOW,
takes scaling a step
further by allowing such
special effects as zooms
and pans.

a styled LINE you then tack a pair of commas and the hex number onto a conventional LINE statement.

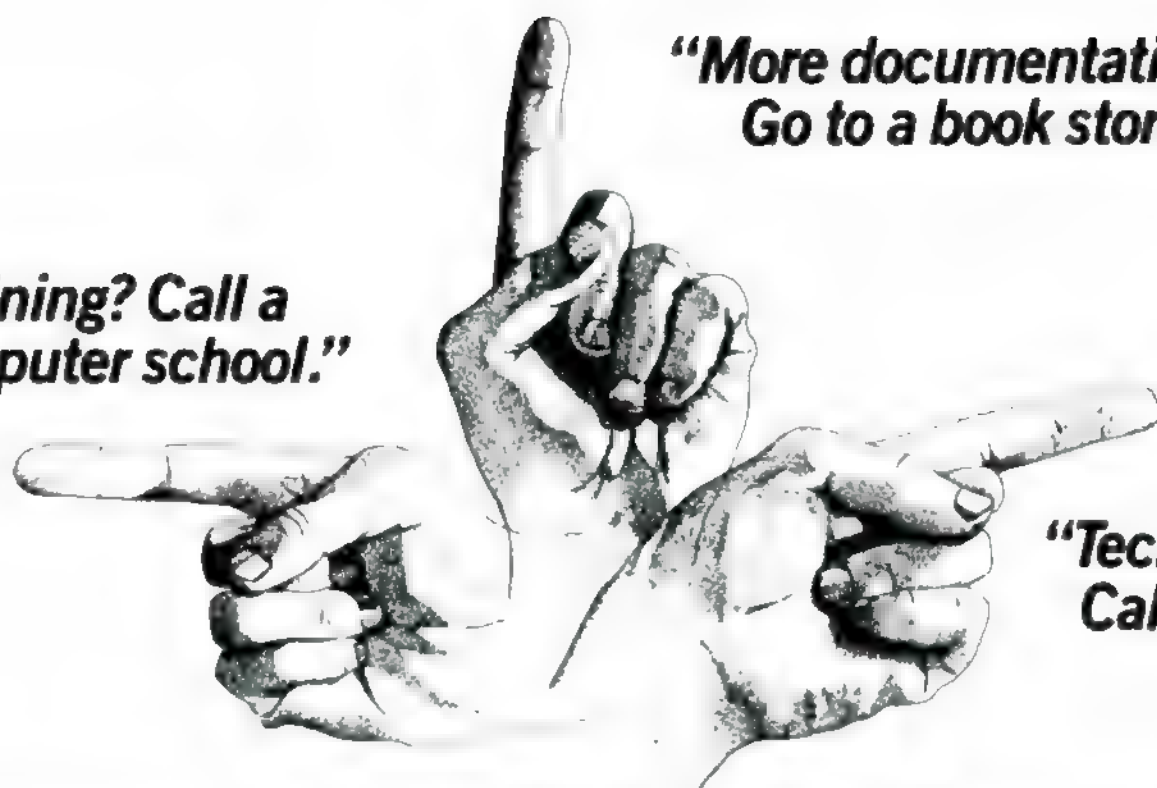
PAINTing By the Numbers

A related, but even more interesting (and complex) new feature is PAINT tiling. In earlier releases of BASIC you could fill in outlines with solid colors only. PAINT tiling does what the name suggests: it lets you fill in areas with repeti-

Figure 2: Program to convert binary numbers to decimal and hexadecimal notation.

```
100 ' "CONVERT" --- Converts binary to decimal and hex
110 ' For readers of PC Magazine / Volume 1, Number 12
120 ' -----
130 ' ==> Enter anything other than "1" or "0" to quit
140 ' -----
150 SCREEN 0:KEY OFF:CLS
160 M=1:BIN=0:PRINT STRING$(37,61)
170 INPUT "Enter binary number: ",B$
180 IF LEN(B$)>16 THEN B$=LEFT$(B$,16)
190 IF RIGHT$(B$,1)="" THEN BIN=BIN+1
200 FOR T=LEN(B$) TO 1 STEP -1
210 IF MID$(B$,T,1)<>"1" AND MID$(B$,T,1)<>"0" THEN END
220 IF T=LEN(B$) THEN 250
230 M=M*2
240 IF MID$(B$,T,1)="1" THEN BIN=BIN+M
250 NEXT
260 PRINT TAB(5);"Hex equivalent= &H";HEX$(BIN)
270 PRINT TAB(5);"Decimal equivalent=";BIN
280 GOTO 160
```


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tive rectangular pattern blocks the way you would tile a wall. After experimenting with it you will be able to create a wide variety of textures and grids—it can even produce shadings that make objects on-screen appear almost three-dimensional.

The individual tiling units form what IBM calls a "tile mask" that is 8 bits wide and from 1 to 64 rows deep. Each row represents one byte; each byte is expressed as the CHR\$ character its bit pattern produces. For instance, the pattern:

1 0 0 1 1 0 0 1

happens to be the binary equivalent of 153 in decimal notation, &H99 in hex. In high-resolution SCREEN 2, adding CHR\$(&H99) or CHR\$(153) at the end of a PAINT statement fills the inside of a polygon with a series of packed-together parallel lines two pixels wide.

By arranging these bytes in a stack, you can create complex dot-pattern shapes. One mode of the "PC-TILER" program in Figure 3 helps you make your own 8 by 8 bit tiles without having to worry about entering any CHR\$ characters whatsoever. With it you can move to any of the 64 "boxes" in the 8 by 8 grid using cursor

P AINT
tiling can produce
shadings that make
objects onscreen appear
almost three-
dimensional.

arrow keys, and fill or erase any box using the INS and DEL keys. It shows you at the top of your screen what the pixel-by-pixel pattern will look like, although the final image will be twice as narrow on the high-resolution screen. Hitting the ESC key will then automatically create up to ten files on your disk named PAINTER.BAS through PAINTER9.BAS.

You can run these mini-programs to see how tiling works or to create a library of patterns. If you want, you can merge these into existing programs or simply take the one line that contains all the CHR\$ characters the program has calculat-

Figure 3: Program to simplify and illustrate BASIC 2.0 PAINT tiling.

```

100 ' "PC-TILER"—Demonstration of BASIC 2.0 PAINT tiling in high and med res
110 ' For readers of PC Magazine Volume 1, Number 12 / Paul Somerson 3/83
120 '
130 ' *** initial setup and menu ***
140 '
150 FOR FK=1 TO 10:KEY FK,"":NEXT
160 SCREEN 0:WIDTH 80:COLOR 4,0,0:KEY OFF:CLS:Q$=CHR$(34)
170 LOCATE 8,37,0:PRINT "PC-TILER"
180 COLOR 1:LOCATE 9,10:PRINT STRING$(61,95)
190 COLOR 6:LOCATE 11,10
200 PRINT "A demonstration of paint-tiling in medium and high resolution"
210 COLOR 3:LOCATE 13,20
220 PRINT "Hit ";Q$;"M";Q$;" for medium res; ";Q$;"H";Q$;" for high res"
230 INK$=INKEY$:IF INK$="" THEN 230
240 IF INK$="H" OR INK$="h" THEN 310
250 IF INK$="M" OR INK$="m" THEN 1370 ELSE 230
260 '
270 ' ===== HI RES =====
280 '
290 ' *** draw, paint grids and add first dot ***
300 '
310 GOSUB 1270
320 FOR A=32 TO 160 STEP 16
330 LINE (100,A)-(228,A),1:LINE (A+68,32)-(A+68,160),1:NEXT
340 FOR C=108 TO 228 STEP 16:FOR D=40 TO 160 STEP 16:PAINT(C,D),2,1:NEXT:NEXT
350 FOR P=6 TO 20 STEP 2:FOR Q=3 TO 10:LOCATE P,Q:PRINT "0":NEXT:NEXT
360 FOR E=6 TO 20 STEP 2:LOCATE E,33:PRINT "&H00":NEXT
370 PSET (H,V)
380 '
390 ' *** main input ***
400 '
410 POKE &H417,&H40
420 I$=INKEY$:IF I$="" THEN 420
430 IF I$=CHR$(27) THEN 870
440 IF I$=CHR$(0)+CHR$(82) THEN 600
450 IF I$=CHR$(0)+CHR$(83) THEN 610
460 IF I$=CHR$(0)+CHR$(72) THEN IF V<41 THEN 410 ELSE V=V-16:GOTO 530
470 IF I$=CHR$(0)+CHR$(75) THEN IF H<123 THEN 410 ELSE H=H-16:GOTO 530
480 IF I$=CHR$(0)+CHR$(77) THEN IF H>219 THEN 410 ELSE H=H+16:GOTO 530
490 IF I$=CHR$(0)+CHR$(80) THEN IF V>151 THEN 410 ELSE V=V+16:GOTO 530 ELSE 410
500 '
510 ' *** cursor/dot ***
520 '
530 IF POINT(M+1,U)=2 THEN PSET(M,U),2 ELSE PSET(M,U),3
540 M=H:U=V
550 IF POINT(H+1,V)=2 THEN PSET(H,V),3 ELSE PSET(H,V),2
560 GOTO 410
570 '
580 ' *** fill and erase subroutines ***
590 '
600 IF POINT (H+1,V)=3 THEN BEEP:GOTO 410 ELSE PAINT (H,V),3,1:GOTO 650
610 IF POINT (H+1,V)=2 THEN BEEP:GOTO 410 ELSE PAINT (H,V),2,1:GOTO 680
620 '
630 ' *** array filler ***
640 '
650 GRIDCOL=((H-76)/16)-1:GRIDROW=((V-8)/16)-1
660 PSET(160+GRIDCOL,GRIDROW),3
670 GRID$(GRIDROW,GRIDCOL)="1":LOCATE 4+2*GRIDROW,2+GRIDCOL:PRINT "1":GOTO 740
680 GRIDCOL=((H-76)/16)-1:GRIDROW=((V-8)/16)-1
690 PSET(160+GRIDCOL,GRIDROW),0
700 GRID$(GRIDROW,GRIDCOL)="0":LOCATE 4+2*GRIDROW,2+GRIDCOL:PRINT "0"
710 '
720 ' *** binary to hex conversion ***
730 '
740 BIN=0:M=1
750 IF GRID$(GRIDROW,8)="1" THEN BIN=BIN+1
760 FOR T=7 TO 1 STEP -1
770 M=M*2
780 IF GRID$(GRIDROW,T)="1" THEN BIN=BIN+M
790 NEXT
800 HEXNUM$(GRIDROW)=HEX$(BIN)
810 GR=4+2*GRIDROW:GC=35+(2-LEN(HEX$(BIN)))
820 LOCATE GR,35:PRINT "0":LOCATE GR,GC:PRINT HEX$(BIN)
830 GOTO 410
840 '
850 ' *** test for three blanks in a row ***
860 '
870 KO=0:FOR W=1 TO 8

```



```

880 IF HEXNUM$(W)="" OR HEXNUM$(W)="" THEN K0=K0+1 ELSE K0=0
890 IF (K0=2 AND W=2 AND (HEXNUM$(8)="" OR HEXNUM$(8)="" OR K0=3 THEN 920
900 IF (K0=2 AND W=8 AND (HEXNUM$(1)="" OR HEXNUM$(1)="" THEN 920
910 NEXT:GOTO 960
920 BEEP:LOCATE 23,2:PRINT "You have too few pixel rows to paint;"
930 LOCATE 24,2:PRINT "Hit any key and add at least one more ";
940 ADD=INKEY$:IF ADD="" THEN 940 ELSE GOSUB 1290:GOTO 410
950 '
960 ' *** color and filename ***
970 '
980 LOCATE 24,3:PRINT STRING$(37,32);
990 LOCATE 23,3:PRINT "Select a tiling color from 1 to 7:";SPC(3)
1000 COL=INKEY$:IF COL="" THEN 1000
1010 COL=VAL(COL):IF COL<1 OR COL>7 THEN BEEP:GOTO 870
1020 LOCATE 23,2:PRINT "You may give your file a number from "
1030 LOCATE 24,2:PRINT "1 to 9—otherwise just hit <Enter>:";
1040 FILNBR=INKEY$:IF FILNBR="" THEN 1040
1050 IF FILNBR=CHR$(13) THEN FILNBR="":GOTO 1070 ELSE AF=ASC(FILNBR)
1060 IF AF>57 OR AF<49 THEN BEEP:LOCATE 24,37:PRINT SPC(3);:GOTO 1020
1070 NAM1="PAINTER"+FILNBR+".BAS"
1080 '
1090 ' *** create "PAINTER.BAS" program on your disk ***
1100 '
1110 LOCATE 23,2:PRINT SPC(37)
1120 LOCATE 24,2:PRINT SPC(37):LOCATE 24,8:PRINT "CREATING FILE ";Q$;NAM1$;Q$;
1130 OPEN NAM1$ FOR OUTPUT AS #1
1140 PRINT #1,"5000 ' ";NAM1$
1150 PRINT #1,"5010 SCREEN 2:OUT 985,";COL;"CLS"
1160 PRINT #1,"5020 LOCATE 1,35:PRINT "+Q$+NAM1$
1170 PRINT #1,"5030 LINE (20,20)-(620,175),1,B"
1180 PRINT #1,"5040 PAINT (320,97),CHR$(&H"+HEXNUM$(1)+"")+CHR$(&H"+HEXNUM$(2)+"")
+CHR$(&H"+HEXNUM$(3)+"")+CHR$(&H"+HEXNUM$(4)+"")+CHR$(&H"+HEXNUM$(5)+"")+CHR$(&H"+HEXNUM$(6)+"")+CHR$(&H"+HEXNUM$(7)+"")+CHR$(&H"+HEXNUM$(8)+"")
1190 PRINT #1,"5050 LOCATE 25,8:PRINT "+Q$+" TO CREATE ANOTHER PATTERN HIT <ESC>
—TO QUIT HIT ANY OTHER KEY "+Q$+CHR$(59)
1200 PRINT #1,"5060 IF=INKEY$:IF IF=""+STRING$(2,34)+" THEN 5060"
1210 PRINT #1,"5070 IF=CHR$(27) THEN RUN "+Q$+"PC-TILER"+Q$+" ELSE SCREEN 0:C
OLOR 1,7,2:CLS:LIST"
1220 CLOSE #1
1230 RUN NAM1$
1240 '
1250 ' *** setup ***
1260 '
1270 DEF SEG=0:SCREEN 1,0:COLOR 1,2:H=108:V=40:H=H:U=V:KEY OFF:CLS
1280 LOCATE 3,3:PRINT "Binary #";SPC(6);"Pixel Grid";SPC(6);"Hex #"
1290 LOCATE 23,2:PRINT " <INS> fills boxes; <DEL> erases them;"
1300 LOCATE 24,2:PRINT " Cursors move dot; Hit <ESC> when done";
1310 RETURN
1320 '
1330 ' ----- MEDIUM RES -----
1340 '
1350 ' *** setup and opening screen ***
1360 '
1370 SCREEN 1:COLOR 1,2:CLS
1380 LOCATE 11,1
1390 PRINT "Hit ";Q$;"H";Q$;" for hex labels; ";Q$;"D";Q$;" for decimal";
1400 IF=INKEY$:IF IF="" THEN 1400
1410 IF IF="D" OR IF="d" THEN G=0:F=0:GOTO 1440
1420 IF IF="H" OR IF="h" THEN G=1:F=8:GOTO 1440
1430 IF IF="Q" OR IF="q" THEN LOCATE 1,1:END ELSE 1400
1440 COLOR 0,1:CLS:K=0
1450 '
1460 ' *** start of main loop and first column boxes ***
1470 '
1480 FOR N=0 TO 184 STEP 8
1490 K=K+1
1500 LINE (32+F,N+1)-(60,N+6),1,B
1510 A=127+K
1520 PAINT (35+F,N+4),CHR$(A),1
1530 '
1540 ' *** second column boxes; first column labels ***
1550 '
1560 LINE (95+F,N+1)-(124,N+6),1,B
1570 B=151+K
1580 LOCATE (N+8)/8,1+G

```

PAINT tiling on the high-resolution screen is fairly straightforward, since there are only two color choices: background and foreground. IBM made no provision for color in **SCREEN 2**, but you can produce a colored foreground using the statement:

where N is a color from 1 to 15 (1 = blue, 2 = green, etc.)

[illegible]

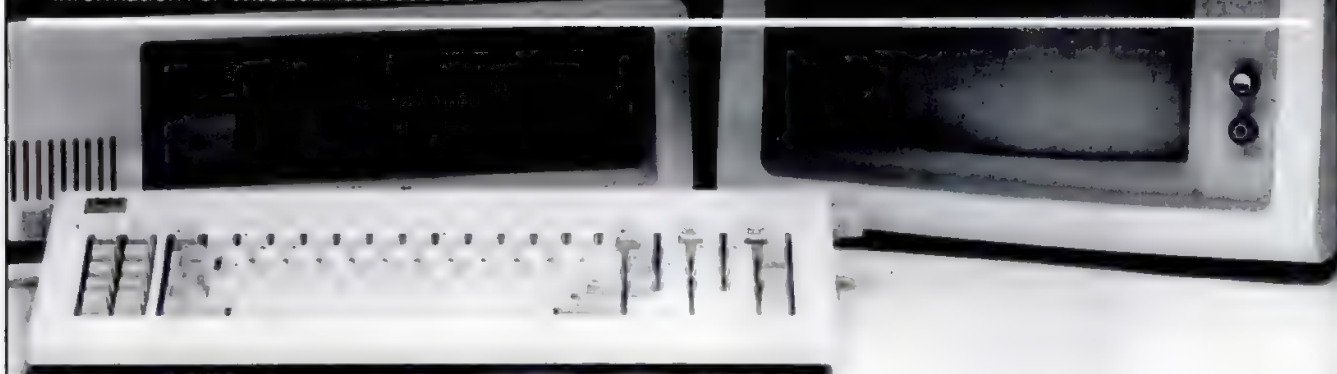
1	1	0	0	0	1	0	0
1	0	1	0	1	0	1	0
1	0	1	0	1	0	0	0
1	1	0	0	1	0	0	0
1	0	0	0	1	0	1	0
1	0	0	0	0	1	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0

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Figure 3: Program to simplify and illustrate BASIC 2.0 PAINT tiling.

```

1590 IF F=0 THEN PRINT LEFT$(STR$(A),4); ELSE PRINT "&H"+HEX$(A);
1600 PAINT (99+F,N+4),CHR$(B),1
1610 '
1620 '      *** third column boxes; second column labels ***
1630 '
1640 LINE (160+F,N+1)-(188,N+6),1,B
1650 C=175+K
1660 LOCATE (N+8)/8,9+G
1670 IF F=0 THEN PRINT LEFT$(STR$(B),4); ELSE PRINT "&H"+HEX$(B);
1680 PAINT (163+F,N+4),CHR$(C),1
1690 '
1700 '      *** fourth column boxes; third column labels ***
1710 '
1720 LINE (224+F,N+1)-(252,N+6),1,B
1730 D=199+K
1740 LOCATE (N+8)/8,17+G
1750 IF F=0 THEN PRINT LEFT$(STR$(C),4); ELSE PRINT "&H"+HEX$(C);
1760 PAINT (227+F,N+4),CHR$(D),1
1770 '
1780 '      *** fifth column boxes; fourth column labels ***
1790 '
1800 LINE (288+F,N+1)-(316,N+6),1,B
1810 E=223+K
1820 LOCATE (N+8)/8,25+G
1830 IF F=0 THEN PRINT LEFT$(STR$(D),4); ELSE PRINT "&H"+HEX$(D);
1840 PAINT (291+F,N+4),CHR$(E),1
1850 '
1860 '      *** fifth column labels, end of loop ***
1870 '
1880 LOCATE (N+8)/8,33+G
1890 IF F=0 THEN PRINT LEFT$(STR$(E),4); ELSE PRINT "&H"+HEX$(E);
1900 NEXT
1910 '
1920 '      *** setup to create file; CHR$ test ***
1930 '
1940 TEMPS="":IF I$="H" OR I$="h" THEN KNTR=4 ELSE KNTR=3
1950 LOCATE 25,2:PRINT SPC(3);"Enter a number or hit ";Q$;"Q";Q$;" to quit ";
1960 P$=INKEY$:IF P$="" THEN 1960
1970 IF TEMPS="" THEN IF P$="Q" OR P$="q" THEN LOCATE 1,1:END
1980 IF KNTR=4 THEN IF TEMPS="" THEN TEMPS="&H":P$="":GOTO 2020
1990 V=ASC(P$):IF V>47 AND V<58 THEN 2020
2000 IF KNTR=4 THEN IF V>64 AND V<71 OR V>96 AND V<103 THEN 2020
2010 BEEP:GOTO 1960
2020 TEMPS=TEMPS+P$:LOCATE 25,1:PRINT SPC(38);:LOCATE 25,19:PRINT TEMPS;
2030 IF KNTR=4 THEN IF LEN(TEMPS)=4 THEN 2050 ELSE 1960
2040 IF LEN(TEMPS)=3 THEN 2050 ELSE 1960
2050 IF VAL(TEMPS)>127 AND VAL(TEMPS)<248 THEN 2110
2060 BEEP:LOCATE 25,5:PRINT "INVALID CHR$ NUMBER--HIT ANY KEY";
2070 Z$=INKEY$:IF Z$="" THEN 2070 ELSE 1940
2080 '
2090 '      *** naming of file to be created ***
2100 '
2110 LOCATE 25,3:PRINT "Enter # from 1-9 or just hit <ENTER>";
2120 T$=INKEY$:IF T$="" THEN 2120
2130 IF T$=CHR$(13) THEN T$="":GOTO 2150
2140 IF VAL(T$)>0 AND VAL(T$)<10 THEN 2150 ELSE BEEP:GOTO 2110
2150 NAM$="MEDRES"+T$+".BAS"
2160 '
2170 '      *** file creation ***
2180 '
2190 LOCATE 25,1:PRINT SPC(38);:LOCATE 25,8:PRINT "CREATING FILE ";Q$;NAM$;Q$;
2200 OPEN NAM$ FOR OUTPUT AS #1
2210 PRINT #1,"10 ' "+Q$+NAM$+Q$
2220 PRINT #1,"20 SCREEN 1:COLOR 0,1:KEY OFF:CLS"
2230 PRINT #1,"30 LOCATE 1,16:PRINT ";Q$;NAM$
2240 PRINT #1,"40 LINE (12,12)-(310,154),3,B"
2250 PRINT #1,"50 PAINT (160,82),CHR$("+Q$+TEMPS+")"
2260 PRINT #1,"60 LOCATE 21,8:PRINT "+Q$+"This paints with CHR$("+Q$+TEMPS+")"
2270 PRINT #1,"70 LOCATE 23,3:PRINT "+Q$+"Hit <ESC> to rerun; any other to quit"
+Q$
2280 PRINT #1,"80 I$=INKEY$:IF I$="";STRING$(2,34);" THEN 70"
2290 PRINT #1,"90 IF I$=CHR$(27) THEN RUN ";Q$;"PC-TILER";Q$;" ELSE SCREEN 0:WID
TH 80:COLOR 1,7,2:CLS:LIST
2300 CLOSE #1
2310 RUN NAM$

```

HEX	DECIMAL
&HC4	196
&HAA	170
&HA8	168
&HC8	200
&H8A	138
&H84	132
&H00	0
&H00	0

The rightmost column and the two lowest rows were intentionally left blank to separate adjacent tiles so that they would not blur into one another and become indecipherable. Figure 5 shows what the screen looks like after the above pattern has been entered. A screen dump of the resulting high res PAINT tiling appears in Figure 4.

While PC-TILER is based on an 8 by 8 grid, you may create PAINT tiling patterns with as few as one CHR\$ row or as many as 64. PC-TILER is structured to work for 8, and like BASIC, will not allow you to have more than two blank rows (CHR\$(&HO)) on top of each other.

Can You Spare Two Bits?

PAINT tiling in medium resolution is slightly more complicated. On the high resolution screen you don't have to worry about different colors; a pixel is either turned on (1) or off (0). Each one or zero represents one pixel. However, there are two bits per pixel on the medium resolution screen, one for positioning on the screen and the other for the pixel's color. So each 8-bit byte represents 8 dots in high res and only 4 in medium res.

Because of this, a solid row of dots on the medium resolution screen has to be expressed as:

10101010 (&HAA in hex)

if you want it to appear in magenta or red; and:

01010101 (&H55 in hex)

to appear in cyan or green. For a white or brown row, you must use:

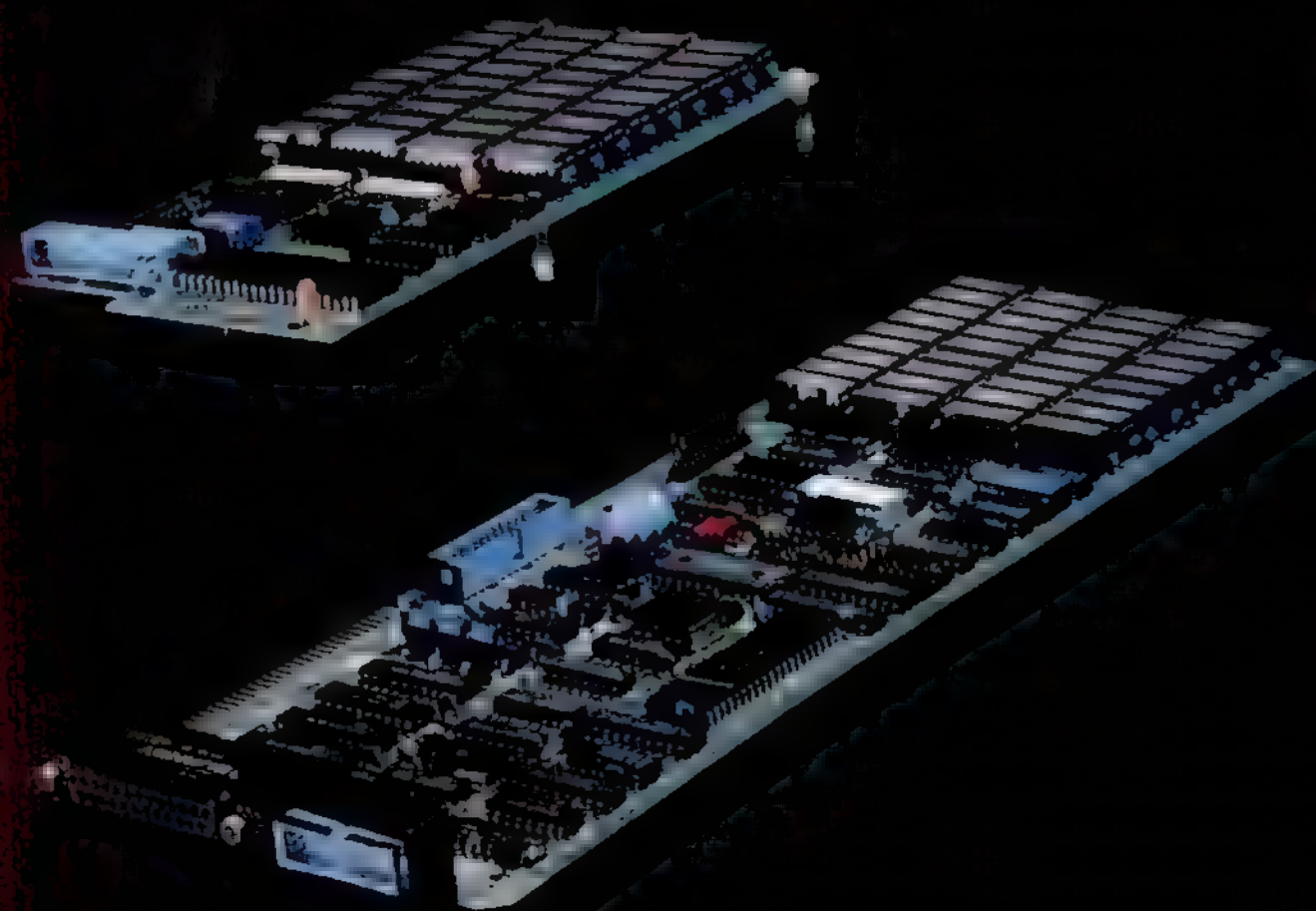
11111111 (&HFF in hex)

The palette you select before you paint determines in each case above which of the two colors appears. Remember, even though the above examples contain 8 bits, they will generate only 4 dots on your screen.

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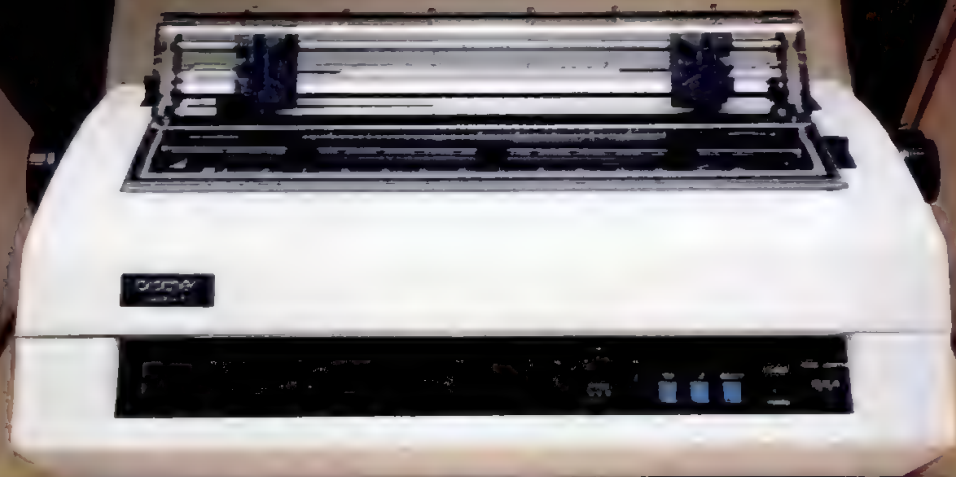
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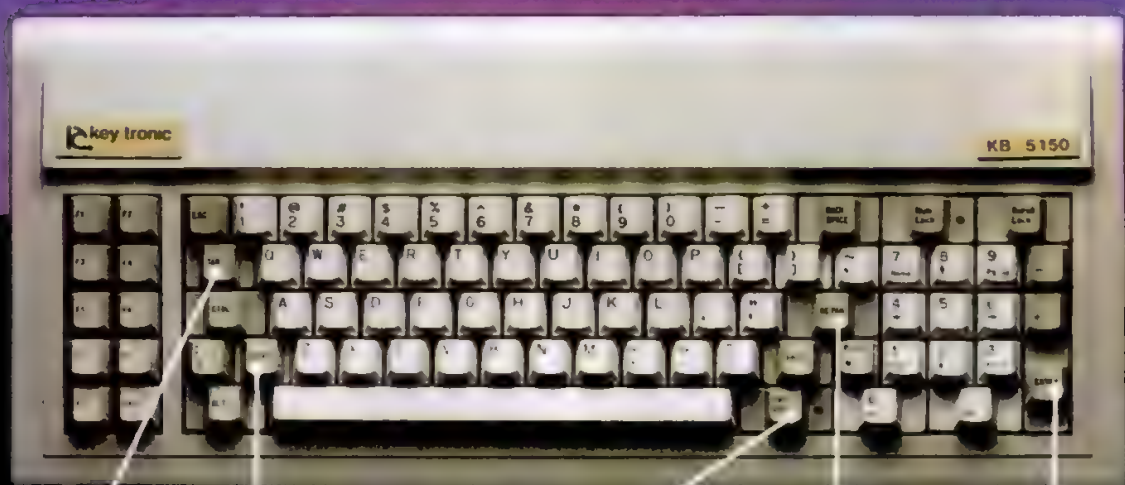
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Figure 5: Photograph of PC-TILER screen showing 8 by 8 grid.

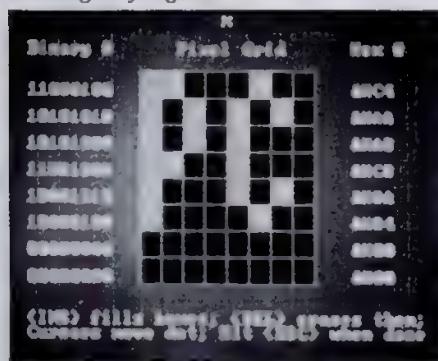
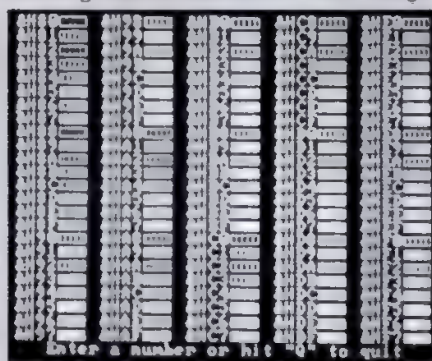


Figure 6: Photograph of PC-TILER screen showing medium-resolution PAINT tiling.



is "brown," it means brown. Most color monitors seem to have trouble producing a true brown and yield a dark yellow instead (since brown is really color 6, the low-intensity version of yellow, which is color 14 on the IBM scale). We were pleasantly surprised to see a rich, luxuriant brown on the new IBM color monitor. Also, the display extends all the way to the edge of the screen; there is no unsightly black frame between it and the border of your tube. In fact, virtually everyone who looks at this monitor drops his jaw and mutters to himself about scraping together the necessary \$680. Word is that IBM precisely adjusted the monitor's electronics to match the output of the color board. Whatever they did sure looks good. Now both IBM's monitors blow the competition out of the water.

The PC-TILER program in Figure 3 also lets you experiment with medium resolution PAINT tiling. With it you can see on one screen what 120 different CHR\$ character codes will look like. Choose one character and create a file that PAINTs a rectangle using it. Again, you can run the small program PC-TILER saves on your disk to demonstrate medium res PAINT tiling or simply insert the appropriate lines into your own programs. A photograph of the CHR\$ PAINT choices and their hex labels appears in Figure 6.

PC-TILER lets you label these 120 tiling slices either in hex or decimal notation; both work equally well in a PAINT statement. It displays the PAINT tiling results using CHR\$(128) through CHR\$(247), which is the same as the hex characters CHR\$(&H80) through CHR\$(&HF7). To experiment with characters up to CHR\$(255), change the value of K in line 1440 to read K=8—or make it K=-127 to see the range of tile patterns

from CHR\$(1) through CHR\$(120).

Slow on the DRAW

The other significant BASIC 2.0 graphics enhancement is a slightly expanded DRAW statement. DRAW is the only tool available to PC users to create detailed pictures with curved or jagged lines. But producing a complex image with it is usually a tedious process. Several software manufacturers have introduced packages that let users make such images with cursor commands rather than DRAW strings, but even these can be perplexing. Producing eye-popping graphics will not be easy until manufacturers and users of digitizing pads, mice, lightpens, touch screens, trackballs, and joysticks begin developing software to put these peripherals through their paces.

DRAW in BASIC 2.0 includes a "P" command that will set a PAINT color and border color. But the best news is the new turn angle, or "TA" command. This will turn figures through 360°, in slices as small as one degree. A positive angle will rotate an image counterclockwise and a negative angle clockwise. This makes

what are called "spirographics" a snap to create. For instance, the trivial program:

```
10 SCREEN 1:COLOR 1,1:CLS
20 BOX$="U40R48D40L48"
30 FOR Z=1 TO 360 STEP 10
40 DRAW "TA=Z;XBOX$;"
50 NEXT
```

will rotate a box around a central point to produce a decorative wheel.

As a shape rotates, the PC automatically compensates for the fact that the screen is rectangular rather than square. If it didn't do this, the final picture would look squat and distorted. The TA command can also create spokes around a central point, help animate objects, and let you handle perspective imagery more adroitly.

A Dummy Argument

BASIC 2.0 also offers several new music tools: a slightly enhanced PLAY, a PLAY(n) function, and an ON PLAY statement. The PLAY statement now offers >n or <n options that jump notes up or down whole octaves. PLAY(n) lets you know how many notes (up to a maximum of 32) are in the PC music buffer. The music buffer allows a program to play music in the background while doing something else simultaneously. If this were not possible, all activity would freeze until the music stopped playing. The (n) is what IBM calls a "dummy argument," which means it is needed only so the computer can recognize it as a function—you can slip in anything between the parentheses.

The sample PLAY(n) program in the IBM manual is a bit bewildering; you type it in and it doesn't do much. The "MUSIC" program in Figure 7 uses the same "tune" as the IBM example, but may give you a better idea of how this function

Figure 7: Improved program to illustrate BASIC 2.0 background music buffering.

```
100 ' "MUSIC" --- Demonstration of BASIC 2.0 PLAY(n) function
110 ' For readers of PC magazine / Volume 1, Number 12
120 SCREEN 0:WIDTH 80:KEY OFF:LOCATE ,,0:CLS
130 IF PLAY(0)>0 THEN 130
140 PRINT STRING$(80,61)
150 PRINT TAB(20);"Enter a number from 1-6; or 9 to quit: ";
160 N=VAL(INKEY$):IF N=0 THEN 160 ELSE IF N=9 THEN END
170 IF N>0 AND N<7 THEN PRINT N:PRINT ELSE 160
180 PLAY "MB T200 CDEFGAB"
190 FOR A=1 TO 100
200 PRINT A;
210 IF PLAY(0)=N GOTO 230
220 NEXT
230 PLAY "MB 04 T200 L4 MS GG#GE"
240 GOTO 130
```


works. The program asks you to enter a number that it uses to test how many notes remain in the buffer; the higher the number, the faster you'll get out of the testing loop.

Note that since the music it plays is in the background, there is an additional test in line 130 to prevent you from continuing before the previous loop is done. You can insert a REM at the beginning of this line to see the difference. Also note that if you enter the same number several times in a row you'll get slight variations in your results depending on how well your internal timing matches the PC's.

The Big Event

ON PLAY(n) and its companion PLAY ON work much the same as ON KEY(n) and KEY ON; they both allow event trapping. In this case, the (n) is not a dummy argument; it represents the number of notes you want to trap. Trapping here means waiting until the condition you set the trap for occurs and then interrupting what you are doing to do something else. The line:

```
ON PLAY(10) GOSUB 1000
```

will wait until there are exactly ten notes left in the music buffer and then immedi-

ately branch, or jump, to line 1000 of your program; like PLAY(n) (above), it works with background music only.

To activate ON PLAY(n), you must follow it somewhere in your program with the statement PLAY ON. You can put it on the same line as ON PLAY(n) GOSUB

***To DO ANY
fancy key-trapping, you
have to use all three
KEY statements.***

1000 if you separate the two with a colon, or you can wait until later in the program and put it on its own line. And as with ON KEY(n), you can turn off ON PLAY(n) by using PLAY OFF, or use PLAY STOP to disable it temporarily.

By repeatedly checking on the buffer and jumping to a music-playing subroutine and back to refill it when the buffer empties to a certain point, this statement can play continuous background music. But as the IBM manual cautions, keep the value for (n) low; otherwise, the computer will perform too many traps and tie up the rest of your program.

Normal event trapping has also been expanded. The ON KEY(n), KEY(n), and KEY statements allow six additional key traps in BASIC 2.0. This lets you trap any of the PC's "latched" Shift, Ctrl, Caps Lock, Num Lock, or Alt keys, using the statement:

```
KEY n,CHR$(shift)+CHR$(scan code)
```

where n is an integer from 15 to 20, shift is the value of the particular latched key expressed as a hex number, and the scan code is an integer from 1 to 83 that identifies the key to be trapped.

Where are you supposed to get scan codes? A new appendix, K, reproduces the keyboard diagram and scan code chart from the old Technical Reference Manual. Unfortunately, the diagram is a bit murky and the chart a trifle incomplete. The chart matches each "key position" with its scan code hex value. It doesn't include a column with the name of the key, so finding the hex value becomes a two-step operation. First, you have to pore over the murky diagram to puzzle out which key

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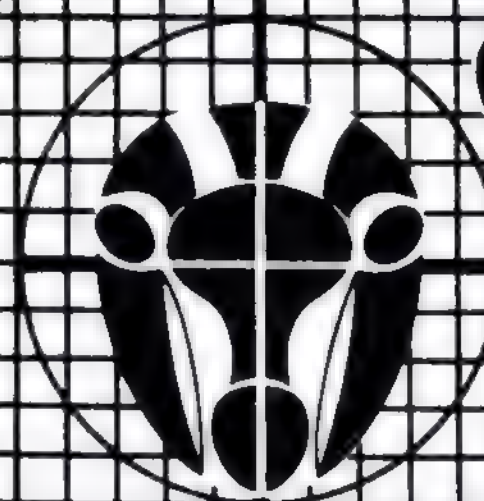
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Figure 8: Improved program to illustrate BASIC 2.0 key trapping.

```

100 ' "TRAPPER" --- Improved version of BASIC 2.0 trapping demonstration
110 ' For readers of PC Magazine / Volume 1, Number 12
120 SCREEN 0:WIDTH 80:KEY OFF:CLS
130 KEY 15,CHR$(&H4)+CHR$(70):KEY 16,CHR$(&H4+&H8)+CHR$(83)
140 ON KEY (15) GOSUB 180:ON KEY (16) GOSUB 200
150 KEY (15) ON:KEY (16) ON
160 LOCATE 5,18,0:PRINT "Hit Ctrl-Break or Ctrl-Alt-Del several times:"
170 PRINT:PRINT:GOTO 280
180 IF TRAPS<4 THEN PRINT TAB(29);"Trapping for CTRL-BREAK"
190 GOTO 210
200 IF TRAPS<4 THEN PRINT TAB(28);"Trapping for CTRL-ALT-DEL"
210 TRAPS=TRAPS+1:ON TRAPS GOTO 220,230,240,250,260
220 PRINT TAB(35);"First trap":PRINT:RETURN
230 PRINT TAB(35);"Second trap":PRINT:RETURN
240 PRINT TAB(35);"Third trap":PRINT:RETURN
250 PRINT TAB(35);"Fourth trap":PRINT:RETURN
260 KEY (15) OFF:KEY (16) OFF:PRINT TAB(30);"Trapping now disabled"
270 PRINT TAB(30);"--Try one more time--"
280 FOR A=1 TO 32000:NEXT:BEEP:GOTO 280

```

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goes with which position code—IBM placed all the numbers between the keys rather than on them. And then you refer to the incomplete chart.

Living Dangerously

If you really want to live dangerously, you can try trapping such combinations as Ctrl-Break or Ctrl-Alt-Del, which will prevent you from ending a program or performing a keyboard system reset. But if you do experiment with this, save your program to disk frequently. Unless you have a foolproof method of turning such traps off whenever you want, you might end up with an unsaved program in memory and a program you can't stop without turning the unit off.

Again, the example in the IBM manual could be better. It jumps from the beginning of the program to the end without mentioning that you need something in the middle for it to work properly. If you run it the way it's printed, you'll stumble prematurely into a subroutine, and all it will demonstrate is how to end a program early with a "RETURN without GOSUB" error. The least you should do if you're trying the IBM version is insert a delay loop like:

```
500 FOR A=1 TO 32000:NEXT
```

The IBM version will keep track onscreen of your Ctrl-Break traps but not your Ctrl-Alt-Del traps. And it will disable the system reset trap only, and not the one for Ctrl-Break. This means you'll be stuck inside the program. PC Magazine's new and improved "TRAPPER" in Figure 8 remedies these problems.

To do any fancy key-trapping you have to use all three KEY statements: KEY(n) tells the system which keys to trap, ON KEY(n) GOSUB tells the program where to go once the key is trapped, and KEY ON turns the whole megillah on. KEY OFF and KEY STOP do their usual magic. One note: the manual uses hex numbers for the shift value and decimal numbers for the scan code. This can become confusing and isn't really even necessary. You can substitute CHR\$(4) for CHR\$(&H04), or CHR\$(12) for CHR\$(&H04+&H08); just make sure you're familiar enough with hex numbers that you don't mix the two improperly.

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... GOSUB statements is ON TIMER(n) GOSUB, with its retinue of STOPS, ONs, and OFFs. This dandy little tool lets you put something up on the screen for a specific period of time without having to calculate how long a whole lot of delay loops are going to take. And by putting the following two lines in your programs, you can have a clock sitting in the upper left-hand corner of your screen, constantly ticking off the seconds:

```
10 ON TIMER(1) GOSUB 30000:
  TIMER ON
30000 LOCATE 1,1:PRINT TIME$:
  RETURN
```

You may want to add a line that reads simply:

```
29990 END
```

to prevent a "RETURN without GOSUB" error message. Also, be sure that the LOCATE 1,1 in line 30000 doesn't play havoc with the rest of a non-LOCATED screen display. If you use a LOCATE here, make certain that all other PRINT statements have their own LOCATEs.

ON TIMER can trap as short an interval as one second, as in the two-liner above, or as long a period as one 24-hour day. Time is kept in seconds, up to a maximum of 86,400. The clock doesn't begin running until you give it a TIMER ON, and it resets to 0 each time it is trapped.

This can come in handy for applications where users have to respond to a question in a certain amount of time or where performance is judged by how quickly certain tasks are done. It can also be used, for example, to call up a help prompt or a menu if an onscreen question remains unanswered for an excessive length of time. This would automatically assist anyone who is so confused about how to proceed that he needs help but doesn't know how to ask for it.

The TIMER function normally tells you how many hundredths of seconds have elapsed since either the previous midnight or the most recent system reset. In previous editions of BASIC, timing events was a somewhat complex procedure that involved converting hours, minutes, and seconds into total seconds. Now, to time the length of a process (in this case an empty 2,000 cycle loop), all you need is:

```
10 A=TIMER
20 FOR LOOP=1 to 2000:NEXT
30 B=TIMER
40 PRINT "THIS TOOK";B-A;
  "SECONDS"
```

You can substitute your own task to be timed between lines 10 and 30.

Not an Old TIMER

Under BASIC 2.0 you can now use this function to reseed the PC random number generator automatically, by inserting the line:

10 RANDOMIZE TIMER

at the beginning of your program. This is needed when you want to generate different sets of random numbers at different times—without it, the PC comes up with the same random numbers each time. In earlier versions you had to reseed the random number generator by responding to a "Random Number Seed" prompt, or strip quasi-random digits off the internal clock with a complicated formula. Here again, the PC manual is sloppy. There is a confusing message at the top of page 4-237



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that really shouldn't be in that spot. RAN-
DOMIZE itself, by the way, now accepts
single- and double-precision expressions
in all versions of BASIC except Cassette.

One revision that is sure to be appreci-
ated by aggrieved programmers is the new
DELETE command, which now makes it
easy for users to erase from any point
inside a program to the end. If you were on
line 900 in a BASIC 1.1 program and
wanted to kill everything that followed,
but didn't know the number of the final
line, you had to either list the program to
discover the number of the last line or

enter a very high line number with one
character on it (such as 30000 A) and then
enter:

DELETE 910-30000

Now you can simply type in:

DELETE 901-

and the unwanted lines will vanish.

Teaching an Old Dos New Tricks

That's about it. BASIC 2.0 does include
a handful of other additions and enhance-
ments. You can make/change/remove di-

rectories with MKDIR/CHDIR/RMDIR; en-
able parity checking when opening a com-
munications file by adding a PE option to
OPEN COM. . . ; use LOF to find the actual
length in bytes of files not created under
BASIC, and EOF to signal the end of a file
when redirecting I/O; and toggle Ctrl-
PrtSc to have your printer echo everything
that appears on your screen, line by line.
When you're in drive A: and you want to
see what's in B: you can enter:

FILES "B:"

without having to add:

* *

For masochists, there are four new errors
you can make, and all errors are now listed
alphabetically in Appendix A along with a
quick reference error guide.

Should you run right out and plunk
down \$60 for DOS/BASIC 2.0? If you're
simply running WordStar or VisiCalc,
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BASIC 1.1; the revisions are more like a
nose job: prettier to look at, and definitely
improved, but still the same underneath.
The addition of PAINT tiling, LINE styl-
ing, WINDOWS and viewports, some fan-
cy event-trapping, and one or two musical
and timing geegaws are all welcome, but
won't stop the presses in a large town.

While BASIC is not the language of
choice among major-league software de-
velopers (the trend lately has been to write
in C), and has carved out a place for itself
at the very bottom of every benchmark
test, for fundamental applications and
experimentation it's not bad. And the
many enhancements in BASIC 2.0 make it
noticeably better than previous versions.
But it still requires long strings of arcane
syntaxes, makes intricate graphics a chore
rather than a pleasure, and pulls in pro-
grammers' reins with such limitations as
255-character lines.

IBM and Microsoft have done a good
job of teaching an old DOS new tricks.
Maybe they'll work some of this magic on
the next implementation of BASIC. There
may be a radically new BASIC to drive the
real PC 2 expected later this year. The
rumors are already flying. /PC



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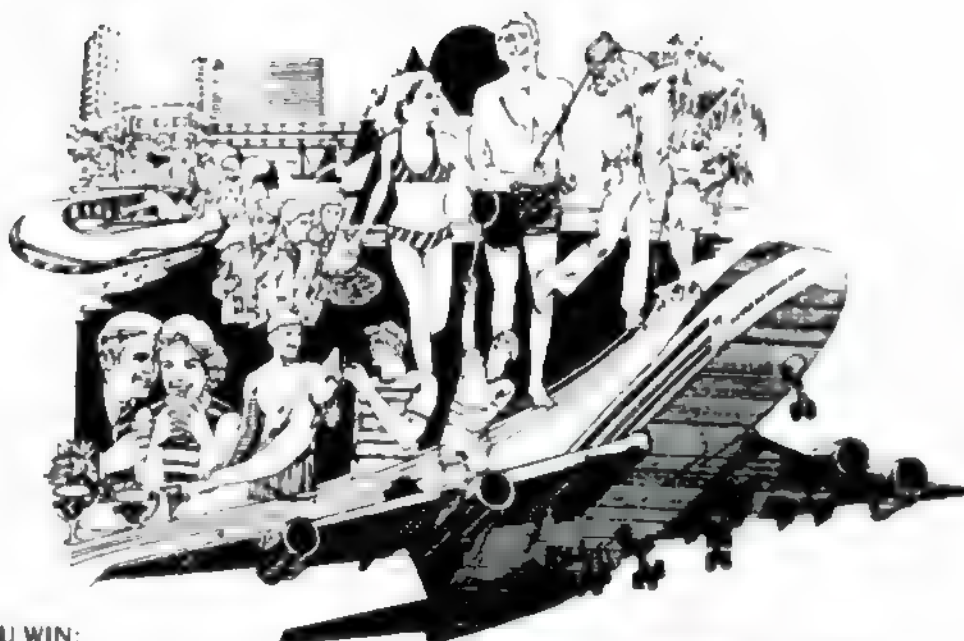
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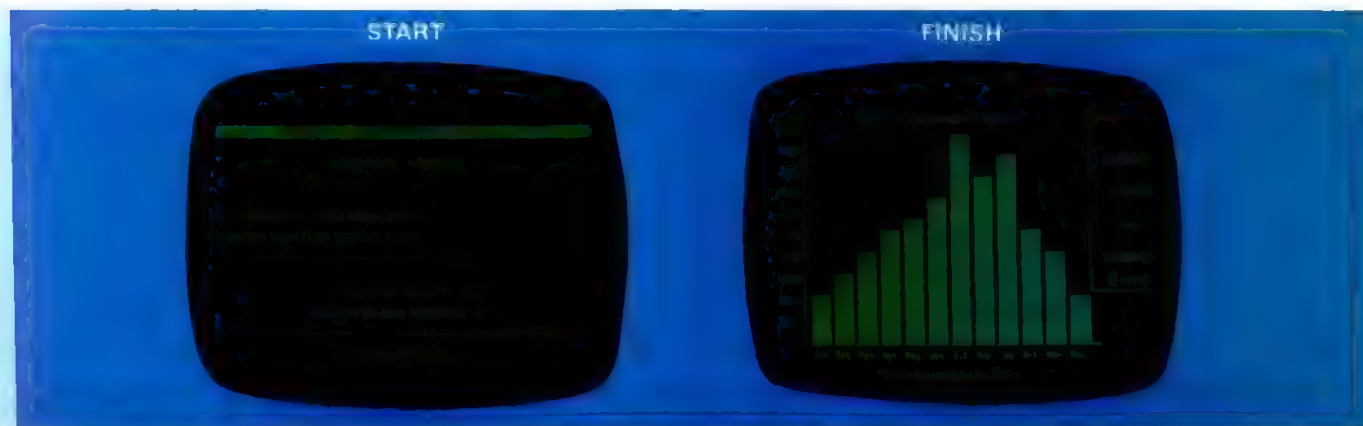
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A PC In Terminal Clothing

IBM's most recent announcements included the debut of the 3270 PC Attachment Option Interface, which connects the PC to IBM's popular 3278 display station. This announcement is the foundation for a bridge between the PC and the huge bank of IBM data processing systems already installed worldwide. The IBM 3278 is a large monochrome (green on black) display screen with an accompanying keyboard. The 3278 is commonly installed as part of a cluster of display stations and printers connected to a cluster controller that is in turn connected to a modem.

The 3270 Family Connection

The 3270 family includes a wide range of devices, including field-configurable controllers, monochrome and color display stations, a four-color matrix printer, and printers with output speeds ranging from 40 characters per second (cps) to 300 lines per minute (lpm). The choice of display stations was recently extended with the announcement of a new low-cost model 3178 and the top-of-the-line large screen gas-plasma 3290 Information Panel. This is the principal terminal for the IBM/370 and 4300 data processing systems; to date, more than 1,000,000 3270 terminals have been installed.

With the 3270 PC Attachment Option Interface, only one monitor and keyboard are required to access both the PC and the

host system. This reduces clutter on the desktop and provides access to the PC from a keyboard that has been familiar to millions of IBM customers for years. Key-strokes on the 3278 keyboard are converted automatically by the supplied software into their PC equivalents. The 3278's Program Function (PF) keys substitute conveniently for the PC function keys.

The 3278 has been IBM's most popular display station, with more than 580,000 installed to date. A wide variety of key-

in companies of all sizes.

The 3270 Personal Computer Attachment consists of two main elements. The first is the 3278 adapter, which after installation by an IBM service technician, modifies the internal logic of the 3278 and provides a path for data transfer between the 3278 and the PC. The second element is user installed into the PC and connected to the 3278 display station through a cable distribution unit. The 3278 keyboard is in turn connected to the cable distribution box.

The base price for the entire package including cables, distribution box, user's guide, and software disks is \$1,700. For use with the attachment, IBM for the first time announced models of the Personal Computer without keyboards. Prices are \$270 lower than comparable PC models. Discounts are in effect for all quantity purchases, ranging from 12 percent for 20 to 49 units to 20 percent for 150 to 249 units. The cost of the interface is considerably higher than the \$615 equivalent for a standard PC keyboard and a monochrome display. The interface, however, also provides communication capabilities that would otherwise require a serial interface and modem. To a company with a base of installed 3270 clusters, the economy of using the same display station and communication network systems is obvious.

The attachment of a PC to the 3278 was IBM's response to numerous requests

**WITH THE
3270 PC Attachment
Option Interface, only
one monitor and
keyboard are required to
access both the PC and
the host system.**

board and display features are offered to meet specific applications, ranging from systems development to data entry and text processing. Every significant IBM software product supports the 3270 and as a result, it has become a common fixture

from some of its largest clients with a large number of installed 3278 display stations. A number of hardware vendors had previously offered interfaces that would connect the PC directly to the cluster controller; however, this announcement also reflects IBM's intention to offer its own extensions to the PC under its own label.

A Versatile Bridge

The IBM 3270 PC Attachment Option permits a single 3278 display station to both communicate with a large mainframe system and to control a PC. Users can switch back and forth with a simple keyboard sequence. The presence of the PC is transparent to the host mainframe system, and a program in the PC can simulate operator entries on the 3278 keyboard and intercept messages from the host. Consequently, a PC may communicate with a multitude of applications already in place, ranging from accounting to database systems.

IBM will also provide model programs for both the PC and the host systems. These are designed to demonstrate how to

pass data between the host and PC. This allows the PC user to take advantage of existing communication networks, most of which operate at 4800 or 9600 baud

THE IBM 3270 PC Attachment Option permits a single 3278 display station to both communicate with a large mainframe system and to control a PC.

with automatic error correction, an ideal way to download data to the PC for desktop analysis.

The PC will provide current users of a 3278 with a wide choice of software not

available on their host systems. The adaptation will also promote more efficient processing. In situations where the host system is near capacity or the user's departmental budget is affected by system usage, the PC may also be an attractive alternative. Perhaps most important, business users may find it easier to gain approval for spending company funds for the PC since it can be viewed as a modification to existing equipment.

Desktop Applications

The interface was announced only for the PC; however, an expansion chassis can be added to provide a hard disk. A hard disk is less of an issue to users with a connection to a large host system than users of standalone PC or PC-XT systems.

"Distributed Processing" has long been a goal of IBM's data processing strategy. It has marketed a number of systems for local processing including the 3800, the 8100, and in some instances, 4331 and 4341 systems. The Boca Raton (PC) organization is in many respects a distant relative of organizations that manufacture



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and support IBM's large scale systems. The IBM 3270 PC Attachment Option will be a bridge between the two organizations.

Prior to this announcement, many corporate data processing departments have been concerned that the installation of PCs would result in the erosion of their control of information processing and analysis. Direct connection of the PC to the 3278 and the implicit connection to the mainframe will reassure many a data processing executive. The PC can now be a full-fledged part of the 3270 family and a component part of fully-faceted decision support systems.

The IBM traditional data processing salesperson can now participate in the "PC Revolution." Previously restricted to marketing block purchases of 20 or more PCs at one time to major accounts, the entire IBM traditional sales force will be able to offer PCs to its customers. For many IBM customers, every product announcement triggers an automatic order. In recent years, IBM has held lotteries to

allocate shipments of its new processors. With up to 100,000 "first day" orders for a single product, delivery schedules have become stretched out for years.

IBM can use this product offering to cement its relationship with many clients. Companies that might have considered installing another manufacturer's person-

with 3278s. Since for many it is easier to order from IBM than explain why "another" company was chosen, the decision to buy IBM PCs is simplified.

With the door now open to a marketplace that IBM has very carefully cultivated for more than 20 years, PC marketing efforts may be entering a new phase. If the number of PCs sold because of the 3278 interface reaches levels predicted by some IBM watchers, the percentage of all PCs in corporate rather than personal or small business use may grow substantially.

THE PC
will provide current
users of a 3278 with a
wide choice of software
not available on their
host systems.

al or desktop computer now have another reason to choose IBM, even if only a small percentage of their PCs will be interfaced

What the Future May Hold

The 3278 keyboard should be compatible with all PC software; however, the 25-line by 80-character display is limited to character data. As yet, no support is provided for graphics or color. In normal operation the twenty-fifth line of the 3278 display is reserved for status information. A tiny "stick man" (who uses semaphore to indicate that the terminal is busy) and other familiar icons, including a small clock (indicating a transmission delay),

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disappear when the operator selects PC mode.

Other IBM announcements for the PC have promised direct PC-to-mainframe communication in 3270 compatible bi-sync protocol. Emulation of a 3270 cluster or 2780/3780 high speed terminal will facilitate many applications in which the PC communicates with a host system. The 3278 interface provides many additional benefits to the company with installed 3278s, including shared communications costs.

Given the large number of 3278s installed on a wide variety of host systems, the display station was a logical choice as an interface point for the PC. Access to the twenty-fifth line and the interception of the keyboard signals are accomplished by a field-installable modification specific to the 3278. With luck, IBM will offer a similar feature for other display stations in the 3270 family, including the low cost 3178 and exciting 3290.

Significant benefit would also be de-

rived from a modification to the 3274 cluster control unit that would permit access from the PC to printers attached to the

OTHER IBM announcements for the PC have promised direct PC-to-mainframe communication in 3270 compatible bi-sync protocol.

cluster. Currently, the 3270 printer cannot even be used to print screen images in PC mode. The 3274 is configured using an IBM-supplied floppy disk and perhaps has sufficient native intelligence to facilitate access to printers in the cluster. Access by the PC to other devices connect-

ed to the cluster would provide a versatile local computing system.

Since the 3270 cluster can be a component of IBM's system network architecture (SNA), it would also be reasonable for 3270 controller and host systems to recognize the PC as a separate virtual device from the 3278 to which it is attached. The PC would then have independent access to the host system, and could then be used separately. More direct access to host system databases by PCs attached to 3270 clusters or emulating SNA protocols will facilitate more sophisticated applications. The PC can serve as a more powerful work station when it can draw on the data resources of host systems.

Of course, this is only IBM's first announcement in this area and there is significant room for development and enhancement as applications develop. While it is unlikely that IBM will sell many additional 3278s, there is little doubt that this announcement will result in the installation of many more PCs by IBM's traditional customer base. /PC

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Though not compatible with PCs, IBM's 3290 gas plasma display may offer a preview of what to look for in the near future—especially if other manufacturers see the light.

Gas-Powered Glass



An IBM spokesman demonstrating the flat glass plasma display in its wide screen mode.

IBM's new gas plasma flat-screen display is one product from Big Blue that came as no surprise. The company has showed it off at conventions and in demonstrations for some time and has been selling it to original equipment manufacturers for incorporation in other products since last November. The announcement that the

unit was available for sale to end users (at \$7,100) is also not the most important part of the news. What is important is that this exciting new technology is finally on the market. IBM may not sell many 3290 Information Panels, but the technology is now officially unveiled, and the race is on to produce cheaper and even better gas

plasma monitors.

Display Capabilities

The gas panel can display 160 characters across by 62 lines down—as many as 9,920 alphanumeric characters and graphics on a 10.7- by 13.4-inch flat screen. The display can be divided into two, three, or

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four sections, and the user can perform as many as four different operations at the same time, using one or more computers.

One proposed application for the screen would be in an airline reservation system, where the operator could keep a listing of available flights on part of the one screen, the customer's name and reservation information on a second quadrant, a credit card validation on the third, and a hotel or rental car database on the fourth. Each segment can be scrolled or operated upon individually.

The panel is designed to work with the IBM System/370, 30XX, and 4300 series computer and with the 8100 information system via an IBM 3274 control unit. No plans were announced to link the plasma panel to the PC or the PC-XT.

Screen Image

The dry technical specifications do not project the proper image of the 3290. The face of the screen is flat, with no noticeable distortion at any point. Unlike a video screen, the image does not flicker since the charge is held until changed. The

THE RACE
*is on to produce cheaper
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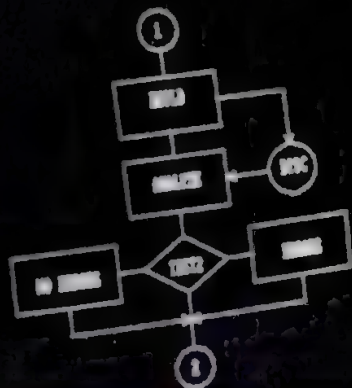
image glows in electric orange, and each letter seems to be printed on the black glass. The effect resembles that of a hologram, the words are sharp and readable from almost any angle.

Glass Sandwich

The 3290's screen is actually a sealed sandwich of two flat glass plates, fewer than 4 mils apart. A grid made up of tiny wires runs between the sheets, and the space is filled with neon/argon gas. The screen can be made to give off an orange glow at any of the 737,280 intersections of the wires. An etched bronze glass filter reduces glare and resists fingerprints.

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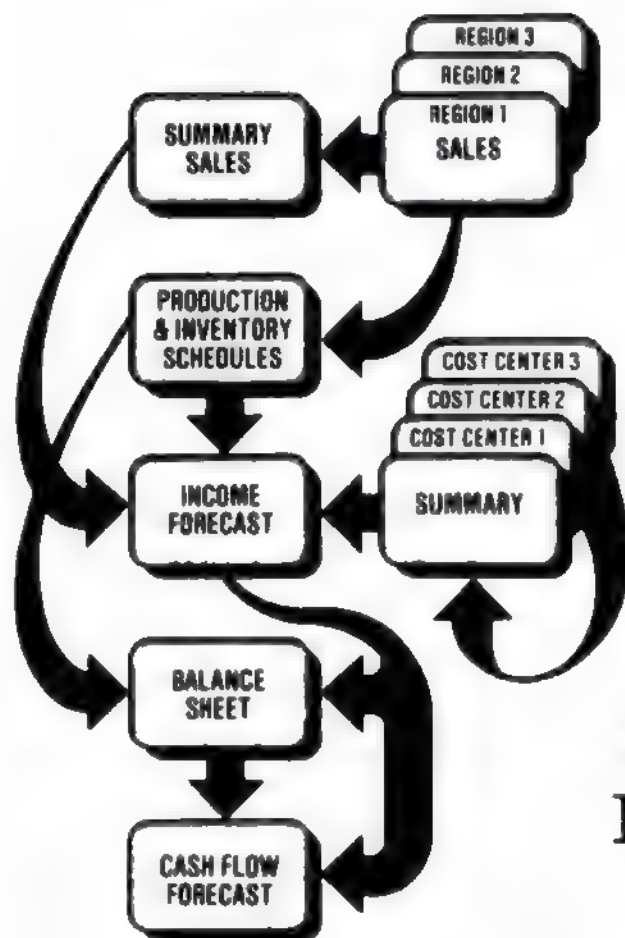
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CIRCLE 494 ON READER SERVICE CARD

Orange Vs. Green

According to Joseph M. Guglielmi, vice president of General and Office Systems Marketing for IBM's Information Systems Group, the screen's orange color is the natural result of the combination of neon and argon gases. This particular mixture minimizes power requirements and moves IBM toward the amber screen, a color many have touted as a more comfortable

THE SCREEN'S
orange color is the
natural result of the
combination of neon
and argon gases.

hue for long periods of work at a video screen. Guglielmi said, however, that he did not know whether IBM had any plans to introduce a standard-technology amber screen.

Special Features

The display's microprocessor produces two character sizes: 5 by 8 and 7 by 9. Graphics programming can draw other fonts. The screen does not presently produce varying intensities but does display underscores, reverse video (black on orange), crosshatching, and shading. A zoom feature allows the user to blow up a particular segment of the screen to fill the entire area.

The 160 by 62 screen will allow the user to display two full business letters or pages of copy side by side. Four full 3278 terminal screens of 80 by 24 characters can also be displayed.

The concurrent processing feature of the screen allows four computers or four applications to run simultaneously. The cursor can jump from one screen to another.

IBM has refused to discuss unannounced projects. Some observers said, however, that they expected the plasma technology to be used in many of the company's future products and in products from other manufacturers. A color plasma screen was also mentioned as a future possibility.

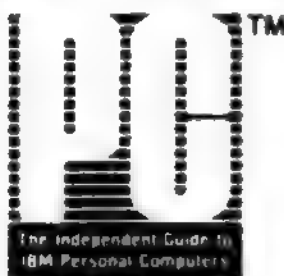
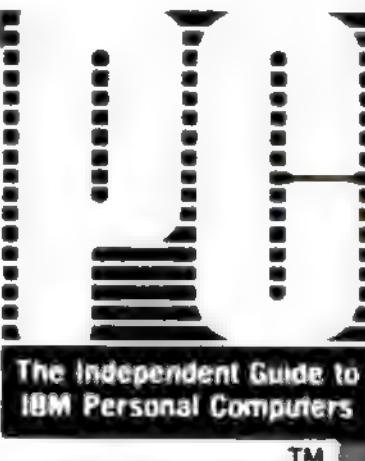
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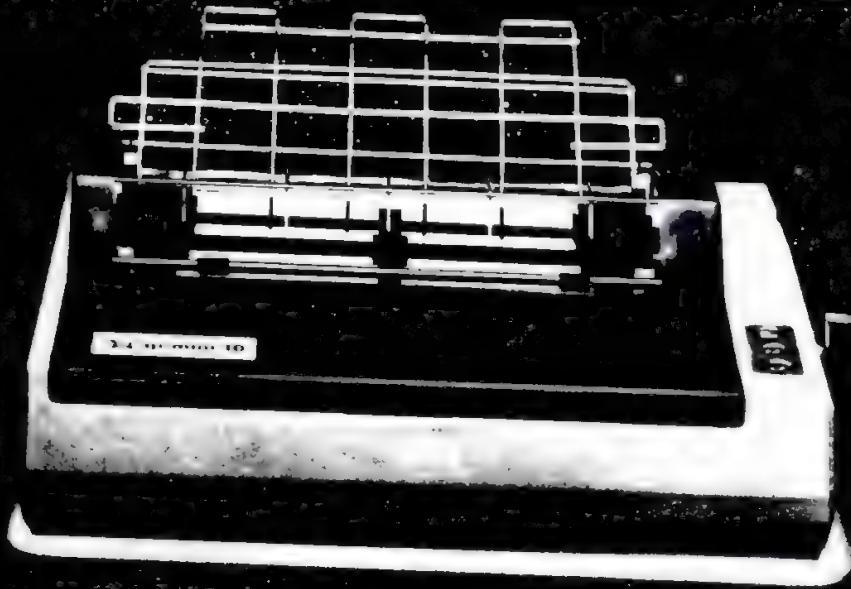
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A veteran observer summarizes IBM's latest product announcements and, mixing speculation with skepticism, tells us what he thinks it all means.

BIG BLUE'S NEW PRODUCTS: GOOD NEWS BAD NEWS

On a Tuesday morning in early March IBM finally did it. After months of speculation in the press and seemingly endless rumor chasing, we now know what IBM has been up to. We didn't learn as much as we would have liked to, but this is not to say that IBM's announcement was without interest. Big Blue unveiled some very significant products that Tuesday morning in New York. Aside from the new version of the PC, the PC-XT, two in particular are of widespread interest: the 3270 PC kit, and the new release of DOS, Version 2.0.

The 3270 PC Kit

First, the PC Kit for an IBM 3270 terminal. The kit includes a PC system unit, an interface, and cabling to convert a 3270-II into a PC. This configuration has no effect on the operation of the terminal as a 3270. A modification to the terminal allows it to

detect a new key sequence, at which point the 3270 display and keyboard become "attached" to the PC.

The significance of this kit lies in the installed base of IBM 3270 terminals, estimated at over 1.5 million units worldwide (not including plug compatibles). Over a life of 5 years, I would guess IBM could penetrate approximately 30 percent of its own installed base without affecting the sales of PCs. That means about 500,000 kits, a staggering number.

The kit is expensive when compared to a stand-alone PC configuration, and you may wonder why a complete PC isn't a better choice. I think there are two reasons. First, I don't know of any 3270 emulation product for the PC that provides 100 percent of the functionality of the terminal; obviously, a 3270 does. Second, the tight coupling of the PC and the 3270 allows the communication link to the 3270 to be shared efficiently by both.

Sharing the link between a 3270 and a stand-alone PC has to be less desirable.

The PC-XT

Most of the hoopla centers around IBM's eXTension to its Personal Computer line, more specifically, to the IBM Personal Computer XT. The product is really the combination of four things: a new system board, the long-awaited IBM hard disk, a bigger power supply, and DOS version 2.0.

The System Board

The new system board was a surprise to me, more for what it isn't than for what it is. It features eight slots, which are closer together than in the original PC (about .75 inch vs. 1 inch). There are six full-size slots and two short ones just behind the rear of the disk drive. The mounting bracket for the cards has changed, and my questions to IBM about bracket compati-

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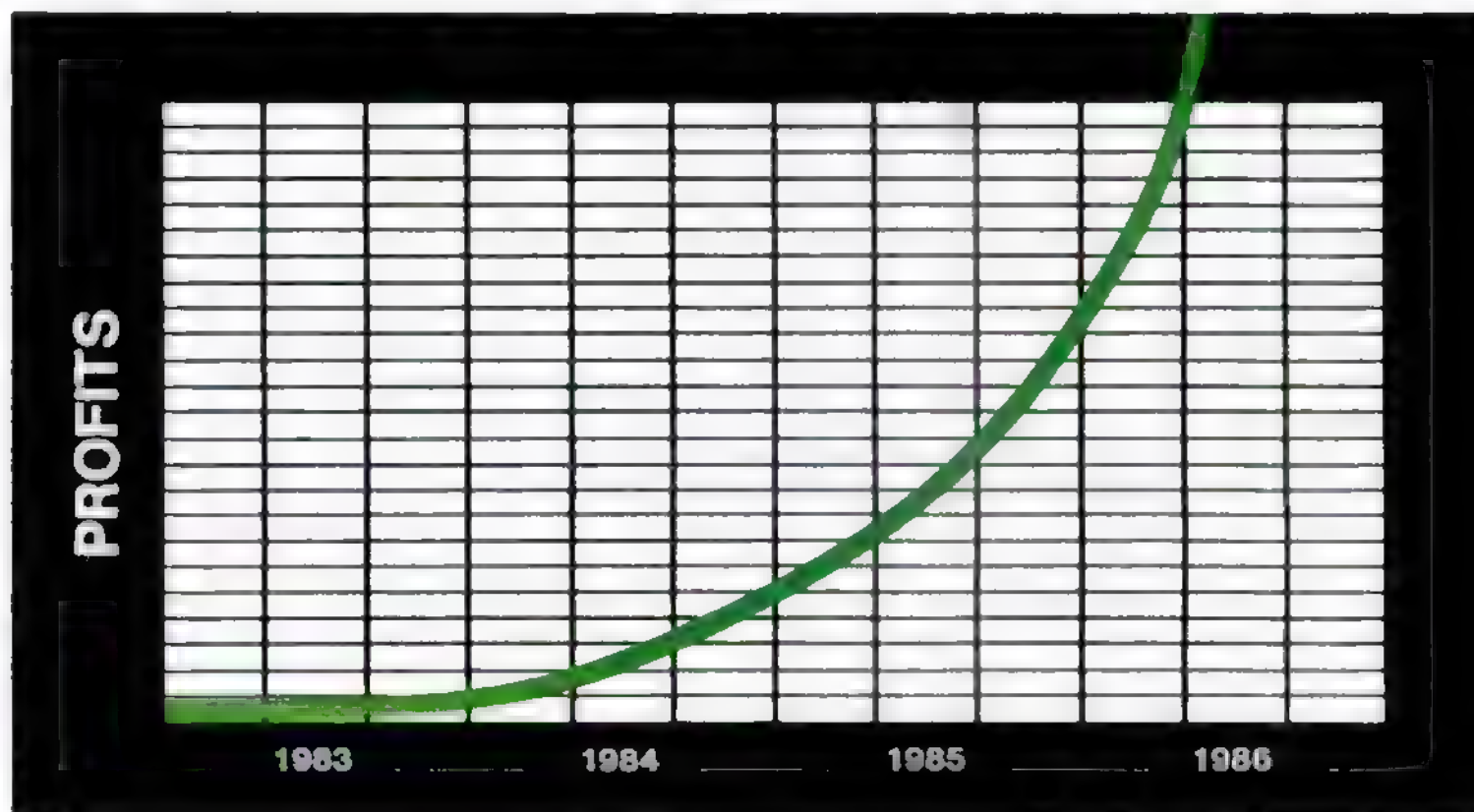
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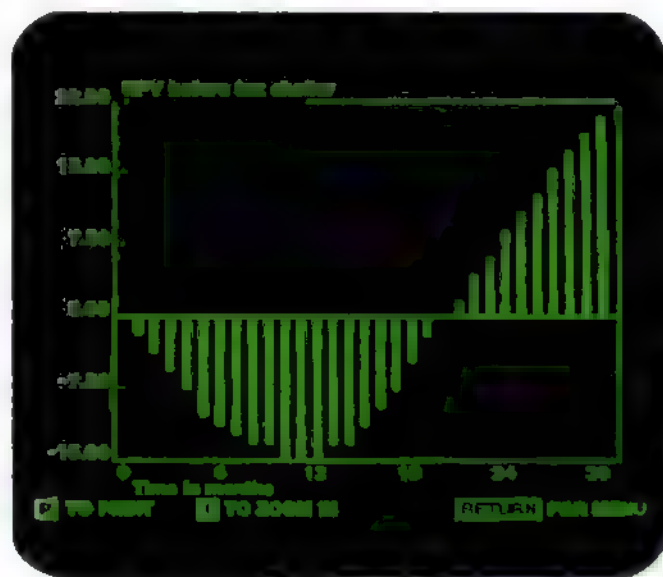
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bility with the PC are unanswered as of this writing. The use of 64K RAM chips allows up to 256K of memory to be installed on the system board. The additional slots and memory are significant; you'll see why a little further on.

T *HE* **introduction of a hard disk from IBM is certainly significant.**

I was sure that IBM would take the next step with this machine and move to a new processor. This was the surprise. I expected the 80188 chip, the one with the CPU and several of the support circuits combined. I also thought the 80186, the 16-bit version of the 188, might show up with a dual 8- and 16-bit bus. And, since both chips can run faster than the 8088, I thought we might see a higher clock rate to accelerate interpretive BASIC. Since the processor remained the same 8088, there is really no technological advance on the

processor card. The choice of 64K RAMs is as conservative now as the choice of 16K chips was when the original PC was introduced, so the new memory is not terribly significant in and of itself.

The system board is markedly different. The 8087 socket is still there. The ROM chips have moved from beside the RAM area to the front corner under the disk drive, but there is no cassette port.

The Hard Disk

The introduction of a hard disk from IBM is certainly significant. But I view the hard disk primarily as the vehicle by which DOS 2.0 arrives on the scene. And now we all know what the interface looks like, third-party vendors can begin to supply subsystems compatible with software for the IBM system. In fact, MicroDisk had an ad on *The Source* the day after the announcement offering a trade-in deal: Send that company the 10-megabyte IBM drive and a little money and it will send you a disk of considerably larger capacity, up to 50 megabytes or so.

IBM has set a new standard for disk capacity by choosing a 10-megabyte drive. This is a direct attack on Apple, with its 5-megabyte hard disk unit. Apple can cer-

tainly make a quick change, but it will be viewed as a response; IBM will seem to be the innovator. Nonsense, of course, but the seed of some great marketing gizmos.

IBM failed completely to provide a responsible means of backing up such large capacity. No backup device was announced, and the speakers at the press conference hurried past the question, answering only that backup and restore capability to disk is provided. Under the best of circumstances, such capability would require 29 disks for a full 10 megabytes. Although I haven't had a chance to try the backup program, I'm told it operates on directories and can hold a hard disk directory, using as many disks as are needed. That's good, but if you have direc-

I **EXPECT** **more from IBM.**

tories smaller than 360K (the new capacity of the disk drives) you waste space on the disks.

I expect more from IBM. It should be applying its knowledge of data processing on big systems to problems such as backup capacity and providing more efficient solutions.

Associated with the hard disk is a bigger power supply to accommodate the power demands of the hard disk. In fact, the power supply is big enough to drive two hard disks. IBM also introduced an expansion chassis, a box that can be used to extend either the original PC or the new XT. On the PC it can house two hard disks. On the XT the chassis can contain a second hard disk and a second floppy disk drive.

How Much Will It Cost?

I give IBM a lot of credit here. The price of \$4,995 for an XT with 128K RAM, one 360K RAM disk, and the 10-megabyte hard disk is very good. Sitting at lunch after the press conference, a group of us figured out that equipping an original PC to match the XT would cost about \$4,700. That's not enough price incentive for a buyer to wander away from IBM, especially when you consider software compatibility. This is going to change the face of

Will IBM Gobble-up The Market?

Not according to the president of one of the leading suppliers of peripherals for the PC.

The introduction of more built-in memory and a fixed disk drive with the IBM PC-XT has been interpreted by some observers as a frontal assault on the peripheral suppliers who've made their fortunes supplying exactly those items to PC owners. How will the XT affect third party suppliers?

We called one of the leading peripherals suppliers, Tecmar, and asked president Martin A. Alpert what he thought about the new competition from Big Blue.

"I think IBM recognized some of the shortcomings of the PC and corrected them with the XT," Alpert explained without a trace of alarm in his voice.

"Does IBM have designs on 'correcting' you out of business?" we asked.

"Anything IBM does provides both problems and opportunities for us," he

continued. "The XT may take away some of our market, but we would rather concentrate on the opportunities it gives us.

"We had an idea that it was coming, so we've been investigating other product areas like hard disk backup, new I/O (input and output) devices, and software.

"Other companies more dependent on Winchester and add-on RAM may have bigger worries," Alpert noted, "but even IBM's new pricing structure is such that third party peripherals will still have a price advantage.

"The XT is good news for everyone concerned with the PC," said Alpert. "Above all it shows that the personal computer market is a main target for IBM—and illustrates IBM's commitment to remain a major factor in that market."

—Winn Rosch



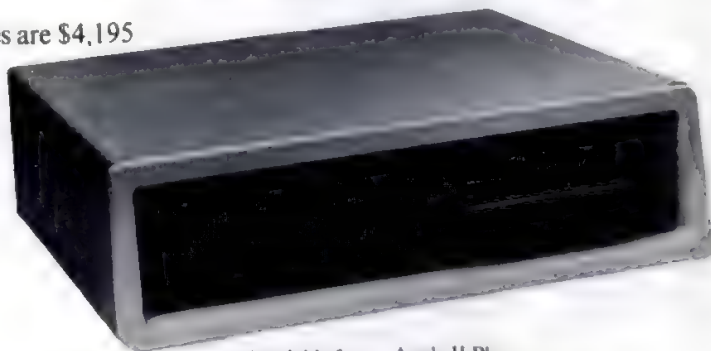
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the market.

The second price blockbuster was reductions on the standard PC. A reasonable configuration now costs about 15 percent less than before! Again, the lunch roundtable expressed the thought that the low end looked much more attractive, although we could not decide how the new price might affect the Apple II.

There is a rumor that the price reductions are for inventory clearance, and that a new model of the PC based on the XT chassis (my designation for the 8-slot, higher-power unit) is coming almost immediately. A 64K unit with one 360K disk

drive would be about \$2,320, a guess based on subtracting component prices from the price for an XT. The price of a similar PC before the reduction was \$2,185. If the rumor is true, it looks like we might really be in for an effective price hike. If this is the case, and you can live without a hard disk, now is a great time to buy! My guess: I'd go with the rumor, because manufacturing two system boards is not as cost-effective as manufacturing one.

Some price reductions are likely to stick or go down even further. A set of nine 64K chips, giving a 64K memory incre-

ment, is now \$165. That's about double the open market price of the chips, but it will be palatable. The 160-180K disk drive is \$289, very competitive with the open market and a real drop from the previous price of \$450. (I guess IBM wasn't selling any.) The 320-360K drives are now \$529 (down from \$640), outrageous when compared to the open market price of \$275 but

SOME PRICE reductions are likely to stick or go down even further.

in the neighborhood of the competition. An asynchronous adapter is now \$120, the color graphics board is \$244, and IBM's 64 to 256K memory board is \$350 with 64K installed.

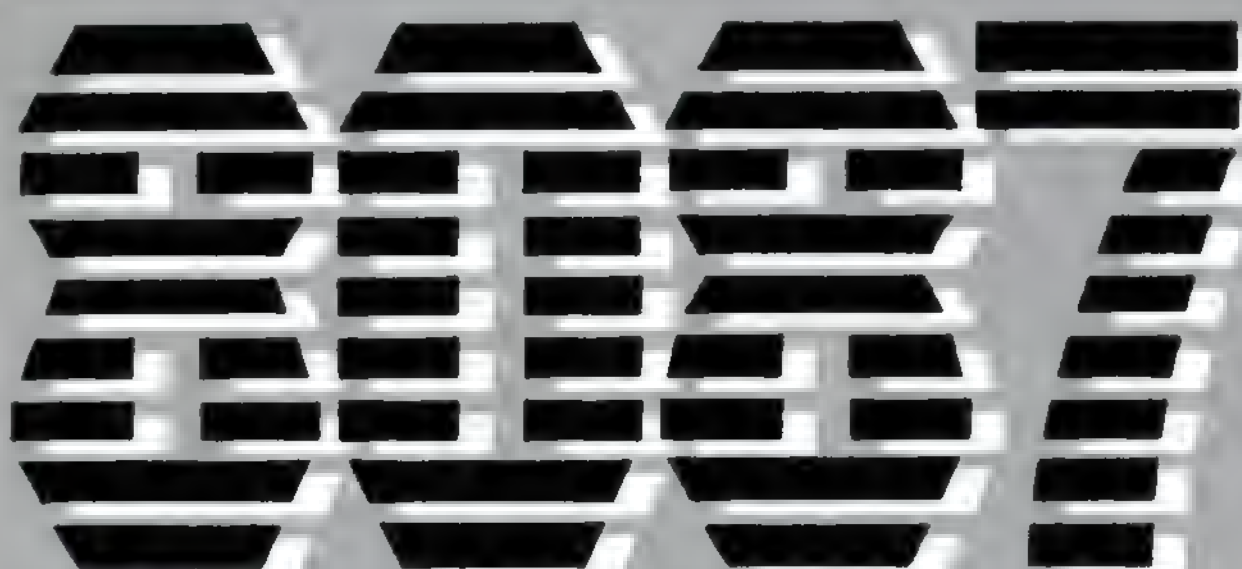
With these prices, a 64K PC with color graphics, a home starter system configuration, is \$1,599 (I'll bet they had to work to make that happen) against a previous price of \$1,835. This is about 13 percent less. Add the small disk drive and DOS 1.1 and the price is \$2,148 (old price: \$2,545).

DOS 2.0

The arrival of DOS 2.0 was a very important part of the announcement. Even so, it was disappointing.

If you're going to do serious work in an efficient way on a computer, you need all the help you can get. I consider IBM DOS (MS-DOS) a very primitive system, and relatively difficult to work with. Although the names of most commands are better than their CP/M counterparts, DOS is not particularly user-friendly. I don't think it provides very much help at all; it is still programmer-oriented.

I thought DOS 2.0 would provide the next step toward a human interface. It did, but my definition of the next step doesn't match IBM's. What we got was an extension of the DOS 1.1 command interpreter (the part of DOS that figures out what you type and what to do with it) and some new commands. My early assessment is that DOS 2.0 is more complicated and potentially more confusing than DOS 1.1. The file system is certainly more complex in



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order to support the hard disk.

What I was looking for was the "visual shell." This is a grand phrase to describe a menu-driven system, one with extensive on-line help and excellent error detection. I thought Microsoft was working on this, because last year in a seminar, representatives from that company talked about it. In fact, the visual shell was the first item on a list of features that they said would be components of DOS 2.0. Either Microsoft hasn't finished its work yet, or IBM decided not to pick it up. I am saddened by its absence. Users need a better tool than the standard interface, one with which they

need not become expert unless they so desire.

DOS 2.0
provides tremendous
new capability and
function, both for
programmers and users.

DOS 2.0 does provide tremendous new

capability and function, both for programmers and users. A number of features usually associated with UNIX are evident, so we could consider this release the next step toward an IBM-supplied version of Microsoft's XENIX. This, at least, should make a lot of programmers happy.

One enhancement is worth noting now. DOS 2.0 extends the capacity of disks by 12.5 percent, from either 160K to 180K RAM or 320K to 360K RAM. Disks recorded by DOS 1.0 and DOS 1.1, regardless of capacity, can be read and written by DOS 2.0. The disk drives previously sold by IBM can read and write the higher capacity disks.

A few other notes. DOS 2.0 can be used on the original PC, but be warned that it is much larger, about 12K RAM. Some programs that previously executed in 64K

NOT ALL
software marketed by
IBM has been converted
to take advantage of the
hard disk.

may require more memory. This is the reason that the standard PC-XT comes equipped with 128K, which has really become the default PC memory size anyway. If your PC is currently configured with 128K, then I expect that 95 percent of your programs will run problem-free with DOS 2.0. Also, programs that do not obey DOS rules may or may not run with 2.0, depending on which rules they break. According to IBM, software that ran in previous versions and obeyed the rules will run on DOS 2.0.

IBM continues a tradition by pricing DOS 2.0 at \$60. Because of the memory requirements (my conclusion), IBM said that DOS 2.0 does not supercede DOS 1.1, which continues to be offered. 2.0 is full of new and wonderful things, and at \$60 is another incredible bargain. No mention was made of CP/M-86 and UCSD p-System support for the XT, and curiously, nobody thought to ask.

Finally, not all software marketed by IBM has been converted to take advantage of the hard disk. A useful IBM pamphlet



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called "Software Fact Sheet" (which should soon be available at IBM Product Centers) tells all.

The Color Display

At the press conference, the XTs were equipped with the new IBM color display, and they were beautiful. The screen is the blackest black, and all 16 colors are spectacular. Brown is actually brown! At \$680, this direct-drive display is not only competitive, it is downright aggressive. The color display is very prominent in XT brochures, making me think that IBM wants the XT to be a color graphics machine.

Note that coming products such as VisiOn

**THE NEW
IBM color display
screen is the blackest
black, and all 16 colors
are spectacular.**

(software that makes the IBM work like Apple's Lisa; see "VisiOn: A Mouse On

The Digital Desktop, "PC Volume 1 Number 10) require full graphics capability.

Rearranging the Marketplace

The introduction of the XT and DOS 2.0 will send a strong ripple through the IBM PC market. The three areas affected most will be manufacturers of add-in cards, manufacturers of hard disk drives, and manufacturers of software. On second thought, let me rephrase my opening statement. The introduction of the XT and DOS 2.0 will send a tidal wave through the IBM PC market.

Add-in card manufacturers, most of whom got off the mark with memory expansion cards, have a big problem. The XT comes out of the box with 128K RAM

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CIRCLE 441 ON READER SERVICE CARD

**THE
introduction of the XT
and DOS 2.0 will send a
strong ripple through
the IBM PC market.**

and an asynchronous port. \$330 more brings the basic system to 256K, more than enough to run just about everything. A second asynch port can be added for \$120. The extra \$450 results in a configuration that requires an investment of about \$750 for the original PC. A 192K RAM card with two serial ports for less than \$450 is going to be tough to build if the vendor still wants to make money. Of course, the XT probably works the same way the PC does, meaning that you must install the system-board memory before you can access memory from add-in boards.

The use of extended memory for electronic disk has been popular with the PC. Although the hard disk is not as fast as RAM, it is fast enough to do most jobs. Some companies—Tall Trees for example—will probably introduce software and large add-in RAM boards for those applications that cannot do without an electronic disk. Such companies will probably not be hurt very much by the PC-XT hard disk.

Hard disk manufacturers will have to scramble quickly to adjust their hardware to match the IBM software specifications.

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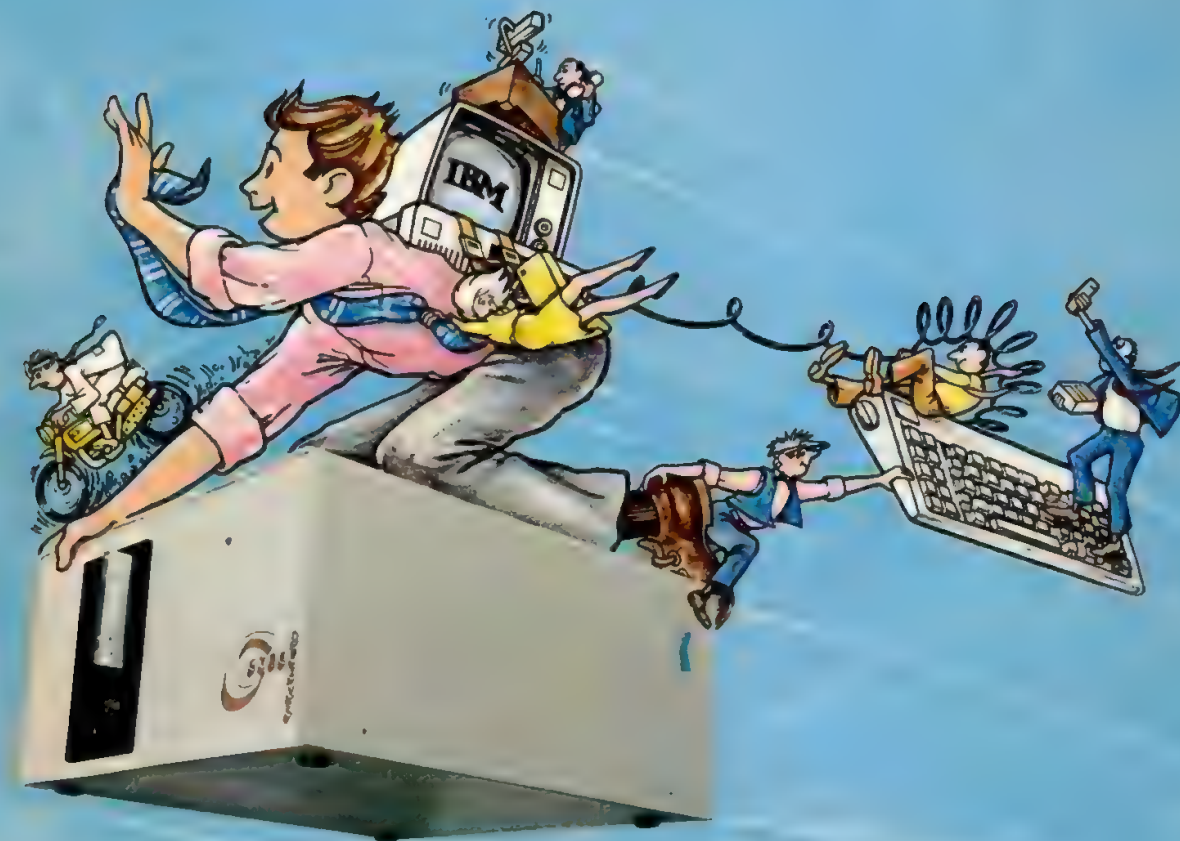


CIRCLE 328 ON READER SERVICE CARD

Minimum System requirements: IBM Personal Computer with BOTH color & monochrome screens: 350K Memory: One disk drive

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CIRCLE 207 ON READER SERVICE CARD

Once they do this, however, they will be able to offer an important advantage over IBM: backup. They will also offer much higher capacities, in the range of 25 and 50 megabytes, rather than 5, 10, or 15.

Although the price of the XT is very good, the price of the disk subsystem should offer competitors a ray of hope. The price of the IBM subsystem—a disk and controller board—is \$2,390. This price does not include an enclosure or a power supply. The going price for a 10-megabyte subsystem is about \$2,495 complete.

As for software, a lot of companies will have to make their programs work in the new environment. Many will have to offer

more powerful member of the PC family, are inevitable. Now that the hard disk sys-

NO MATTER
what happens next,
we're already on a new
PC course, charted for
us by Big Blue.

tem is out, I'd guess that PC II will wait for

the 80286 processor, or maybe even the 386. I put that some distance in the future. The home machine is more likely, based on the 188, and I still believe we'll see such a thing (or dramatic price reductions on the original PC) this year. I don't expect IBM to build a usable portable until its designers can make it fit in a briefcase.

No matter what happens next, we're already on a new PC course, charted for us by Big Blue. I just wish there were more wind in the sails. . . /PC

Will Fastie is the editor of the PC Tech Journal, which will debut in June.

TRYING TO
predict what IBM will
do is not a very
rewarding task.

two versions of their product, one for DOS 1.1 and one for DOS 2.0. This will require a lot of work, and it's going to take time. You may have to be satisfied that your program does not work on the hard disk at first; even IBM is faced with this problem.

Third-party manufacturers obviously have their work cut out for them. They must upgrade their current products and come up with new and innovative products for the future.

What Next?

Trying to predict what IBM will do is not a very rewarding task, except for the obvious things (everybody else has a hard disk, after all). IBM keeps its secrets well, and there are few leaks. I'm reminded of folk stories about Coca-Cola, about how it buys extra ingredients in order to promote uncertainty about the proportions of its popular elixir. True or not, very few people know the formula for Coke.

IBM has such a momentum going that I think it can lay low for a while. There will be a lot of XT-related announcements, especially in the software department. I'm sure there will be a new printer soon. As for computers, I think both "Peanut," the rumored home machine, and "PC II," a

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PeachText Opens To A Mixed Review

PeachText

Peachtree Software Incorporated

IBM Corporation

P.O. Box 1328

Boca Raton, FL 33432

List Price: Not available

Requires: 64K, one disk drive, 80-column display, DOS 1.10 (or later)

CIRCLE 594 ON READER SERVICE CARD

"Another word processing program?" cries the jaded computer owner. "Aren't there enough by now to satisfy even the most finicky fingers!"

In a word, no. Every piece of word processing software I've seen does some things well, some things poorly, and some things not at all. And just about everybody who uses a particular model covets at least a portion of his neighbor's object code—whether it be the *FinalWord* windowing or the *WordStar* page-break display.

Peachtree's *PeachText* (distributed by IBM) enters the ever-growing ranks with its own bizarre blend of brilliance and boneheadedness. It combines blindingly-

fast screen handling with crippling text-entry inadequacies and adds print formatting and mailing-list functions so powerful they almost comprise their own little programming language. Because of these peculiarities, *PeachText* is not something I would recommend to anyone writing for a living. But for a busy office, it might be

just the ticket.

Basics

PeachText requires a 64K PC, at least one disk drive, an 80-column display, and DOS Version 1.10 or later. It's not copy-protected, so it can be run from a disk emulator or a hard disk.



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So, where is it?

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Figure 1: The PeachText 9-option menu display.

Default Disk: A
PeachText Commands

ED - Edit Document
PR - Print Document
CO - Copy Document
DE - Delete Document
RE - Rename Document
DI - Display Disk Directory
CH - Change Default Disk
?? - Get Help
EN - End PeachText
Enter Selection:

PeachText is divided into three parts: the PeachText menu, the edit mode and the print mode. The PeachText menu is what you get when you start the program (See Figure 1).

You really shouldn't have to type two characters and Enter to choose from a nine-option menu; fortunately, you don't use this menu often enough for it to matter much. But having to change the default from Drive A every single time you begin running PeachText is a nuisance. And since you don't automatically get a directory of your files, it's easy to overlook the fact that you're on the wrong drive.

To edit a new document, you enter the ED command and respond to a prompt by

THE
*reformatting is fast, too:
insert or delete a
character, and
everything on the screen
below instantly moves
down or up as needed.*

typing a filename. If you don't assign it an extension, PeachText supplies one: DOC. In fact, if you hit the Enter key without supplying a filename at all, PeachText will automatically open a file called WORKDOC.

You then get the Edit Status Screen,

which gives you tons of information: amount and percent of memory and disk space (both in use and available), tab columns, line width for screen display, name of current document, and presence or absence of such things as word wrap and carriage return display. Hitting Enter takes you either to your text or to the blank screen of a new document.

Creating Text

All working text is stored in memory. The upper limit is 53,911 characters on a system with 128K or more of memory, but there are ways of dealing with bigger files. If you've got more than 128K, too bad.

Screen updates are almost blindingly fast. WordStar takes almost 3 seconds to rewrite a screenful of text. With PeachText, you press the Pg Up or Pg Dn key, the screen briefly turns blank, and the new batch of text is there instantaneously. You can scroll a page of PeachText in either direction almost as fast as you can rewrite a page in WordStar..

Unlike WordStar, however, PeachText isn't smart enough to know that when you hit the PgDn key five times, you don't really care about the four pages inbetween. It insists on displaying each one, however briefly. This tends to slow things down.

To its credit, PeachText reformats onscreen. You never have to worry, as you do with WordStar, about remembering to use Ctrl-B to keep those mysterious characters from sticking out there through column 122. The reformatting is fast, too: insert or delete a character, and everything on the screen below instantly moves down or up as needed. I really do mean instantly; you never have to wait for the screen to catch up.

Cursor: Foiled Again!

Would that the cursor controls could keep up. Pg Up and Pg Dn do what you'd expect, and the Ctrl shifts of those keys zoom you to the top and bottom of your document. End takes you to the end of the current line. Perversely, Home takes you first to the beginning of the current line, and then, with each successive press, bounces you between the top and bottom left of the screen.

But that's about it. There's no fast way to move the cursor by paragraph or by sentence. Even moving by word is a problem. You can set up the Tab key to move you

forward by word, but if you do, the Tab settings become inoperable. Getting to the middle of a line, particularly from the right side of the screen, can be an irritating chore.

The cursor is normally a blinking centered block. Being used to a thin under-

AS IN IBM's
*BASIC, the cursor gets
bigger when you are in
insertion mode—a very
helpful visual clue.*

line, I found it a bit annoying at first, but it became familiar soon enough. As in IBM's BASIC, the cursor gets bigger when you are in insertion mode—a very helpful visual clue.

The cursor will go anywhere, almost, but sometimes putting it in odd places can cause surprises. For example, putting it after a paragraph marker and typing a character will fill out the line with blank spaces up to the character and move the marker one character to the right.

Quick! Get rid of it!

If there's logic behind the layout of the deletion keys, it escapes me. F1 and F2 remove blanks to the left and right of the cursor, respectively. For line delete and sentence delete (both of which operate only on material ahead of the cursor) you go down to F9 and F10. But with fearful asymmetry, F4 deletes a word to the right of the cursor.

Each key requires two presses to delete. The first press marks the text to be deleted in inverse video; the second performs the deletion. This is to prevent errors. You can avoid the deletion by pressing any key other than the one you started with. Personally, I'd rather live with a few accidental word deletions than make all those extra keystrokes just to get rid of half a sentence.

WordStar lets you delete a whole line and put your cursor back at the beginning of it or lets you delete all the material to the left of the cursor on a line. Not so with PeachText. The only way to delete material behind the cursor is to use the back-

space key. But when the cursor is at the left edge of the screen, backspacing won't move the cursor up a line to eat up the preceding character. The deletion key has a similar problem at the right edges of lines; in fact, if it removes the last space in the line, the last word of the line magically moves down a line and joins in unholy

entering your text.

I suspect the reason so many programs put their status lines at the bottom is that it's somehow easier to program them that way. Take it from a working writer: A status line should be at the top of the screen, and it should relate to the task in hand. This one fails on both counts.

Around the Block

Another set of functions I object to is the block-handling setup. To mark a block of text, you use F3 to insert a "delta" at each end. This character is small, hollow, and hard to spot, and PeachText doesn't highlight the block to make things easier for you.

To move a block, you put the cursor where you want the block to go. Then you hit Esc to leave your text and stare at the Edit Screen. In response to a backslash prompt, you type BM for block move, hit the Enter key not once but twice and you're back to your text.

Copying a block works about the same way with a BC command. An XB=FILENAME command will write your block to a separate file. These commands leave the deltas in your text. Moving a block is something else. After a block move, PeachText removes the delta markers, making it less than clear what you've just done.

And PeachText response to errors can be irritatingly sluggish. It will let you enter as many block markers as you choose. It waits until you enter a block command to give you an error message if there are not exactly two. You can then either search for the deltas and replace them or give a BK command to kill all the markers in the file.

When you mark a block, Escape to the Edit Screen, and enter the command BD for "block delete," PeachText shows you the beginning and the end of the block and demands that you confirm that you really want to make the deletion. As with other deletions in PeachText, once they're completed, they're gone forever to that great electron dump in the sky. No buffer zone for second thinkers here. And when you return to your text, you may find your cursor in the general vicinity of where you left it rather than in the precise spot. In preparing this article with PeachText, I found myself deleting short sections of text and retyping them rather than struggling with the block functions. In Word-

Star (as enhanced by ProKey) I would've done it the other way around.

You can add text from another file in one of two ways. An R (Read) command from the Edit Status Screen lets you add a file to the end of the one you're currently working on. To insert a file at the cursor position is a slightly more complex operation. First you type IFILENAME, which "reads" the include file. Then you must type I, which lets you see the file. If it's the one you want, you hit Y to accept it.

One of PeachText's special features is its ability to let you divide a file into coded sections and pick out the one you want when you call it up for inclusion in your current text. This is particularly useful for customizing form letters, but it might be handy in other ways as well.

Another nice option is the D (display) command. This lets you have a look at any file you choose without entering it into your text—nice when trying to decide whether you really wanted to bring in GERBIL8.NOO or GERBIL8.NEW.

Search and Replace

PeachText's search-and-replace functions are typical of most word processors. You can search for a string of characters, and, if you choose, replace it with another string. The search-and-replace can be performed selectively by responding to the prompt given each time a string is found

I FOUND
*myself deleting short
sections of text and
retyping them rather
than struggling with the
block functions.*

or automatically either a specified number of times or throughout the entire document.

Any upper case character entered in a PeachText search string will be matched exactly with an uppercase character, but lower case characters will be matched by either upper or lower case. To limit the search to whole words, it's suggested that you precede and follow the word with a

PEACHTEXT
*doesn't highlight the
block to make things
easier for you.*

and unwanted matrimony with the first word there.

Stick It In Here

Insertions can be accomplished in two ways. Simply pressing the Ins key puts you in insert mode. But pressing the F8 key does something rather more nifty: It clears the screen from the cursor to the bottom. You enter whatever you choose in the empty space, and then hit F8 to close up the text again.

But this mode, too, offers some unpleasant surprises. Using the down arrow or Pg Dn key in this mode will insert a useless column of paragraph markers for you to delete. The status line usually disappears, too.

Status Symbols

The bottom line of the screen is reserved for messages. The good part is that it shows you exactly which toggles you've shifted: Ins, Caps Lock, Num Lock, and/or Scroll Lock. Praise be!

Otherwise, this line is singularly uncommunicative. All it tells you is "Hold Ctrl and Press F1-F10 for Help." Now, how much do you really need this little message? You get the same Help menu no matter which shift key (upshift, Ctrl, or Alt) you hold down while pressing any function key you choose. In fact, you get that menu if you hold down the Ctrl key while pressing almost any key on the cursor pad. But that damned message is almost always glaring at you in headache-making inverse video from the bottom of the screen, precisely where you're usually

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space.

Nor will PeachText search backwards. If you attempt it, the program will display a message that it can't find a match. If you then press F5—repeat search—it'll start at the top of the text and work through to the end. But if PeachText doesn't find a match, it doesn't move your cursor from the current work position. A nice touch, indeed. And unlike most other programs I know, PeachText will find a search string that happens to run across a line break.

Special Effects

In the interest of simplicity, PeachText seems almost philosophically opposed to using the Ctrl key. To do special printing effects, you enter special characters before and after the text in question. For example, you use the tilde (~) key before and after text to be underlined. For boldface type, you use an @ sign. For subscripting and superscripting, you use > and < markers respectively. To print those characters as characters, you have to precede them with a backslash.

Sensibly, such commands are effective only until the closing marker or the end of the paragraph, whichever comes first. This paragraph-end limitation means you won't get one of the WordStar patented this-whole-document-is-underlined-situations.

Having written this, I just discovered another peculiarity of PeachText: Unless you tell it to by inserting an ampersand (&), after each hyphen PeachText refuses to break a phrase or word at hyphens. Dumb.

Moving Around

One of the most annoying things about using PeachText is that it provides almost no help in moving back and forth within your text. There are no dedicated non-printing "markers" as in WordStar to "save your place," and there's no handy way to "move the cursor to where the last block I moved came from"—an essential command to make sure something odd didn't happen in the spot from which you yanked some text.

Nor are there page or line numbers onscreen to help you remember where you are. Probably the most sensible approach would be to devise a standard string (like GRRR!) as a marker and then use the search function to find it. A keyboard enhancer like ProKey might help immea-

surably here.

Saving Graces

A local bank offers "dozens of ways to save." PeachText comes close, with at least eight methods of depositing your document onto a disk—or not deposit it, as the case may be. Some of these com-

IN THE
*interest of simplicity,
PeachText seems almost
philosophically opposed
to using the Ctrl key.*

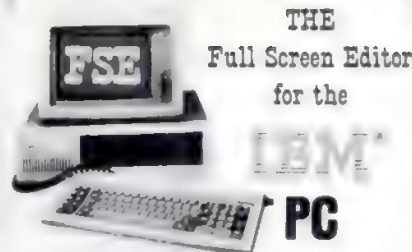
mands, like End and Reedit, rename the previous version of your work to FILE-NAMEBAK. But the X command merely stores your current edit in a temporary file with no backup. This file would be accidentally erased, trashing all your work for one whole session, should you mistakenly exit the edit mode with a Quit command.

Still, you'll probably use the X command to save your work while editing a document. For some reason, it's the only Save command that lets you get back to the current cursor position in your text. The others all force the cursor back to the beginning of the file. From there, you're on your own. Despite the plethora of procedures, none really encourages you to save your text.

Never having attempted it, I remain rather confused about working with a file too long to fit into memory. Apparently you have to write all or a portion of such files to disk, and you have to move forward within each editing session. Once you've written the beginning of a file to disk, you can't work with it again until you've saved the rest of the file. This is a nuisance.

Printing Procedures

You can print directly from the Edit mode, but to do so is not terribly useful. In this "quick print" mode, all formatting commands in your text will print out as they appear on the screen. Since you use these commands to control everything from page numbering to line width, only



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the simplest letter will emerge coherently from "quick print." For most printing to paper (and all printing to disk and to the screen), you go to the Print Status Screen. It can be reached from the PeachText Menu by entering PR or from the Edit Screen by typing PRINT.

PeachText is emphatically not "screen-oriented." What you see when entering text is not likely to be what you will get. The main reason is PeachText's dizzying array of printing and formatting options.

There are two ways to invoke these options. Some, such as margination and line spacing, can be entered from the Print Status Screen. But most options will be selected by commands you embed in your text as you edit it. To indicate a command, you type a backslash followed by the appropriate instructions. With a few exceptions, you can combine multiple commands on a single line by separating them with commas.

Printing Options

Page length, line width, and margins can all be specified and changed at will within the document. Hanging indentations for paragraphs can be specified with a single command. Text can be centered, justified, set flush left and ragged right, or even ragged left and flush right—an unusual feature. Microspace justification

PEACHTEXT
*is emphatically not
"screen-oriented." What
you see when entering
text is not likely to be
what you will get.*

and proportional spacing are available for daisy wheel type printers that can handle them. If you have an IBM dot matrix printer, you can specify any of 15 different type fonts. You can also use foreign and special characters from the IBM extended-character set.

Headings and footings can run as many lines as you need and can be changed at any point in the text. With the use of a

rather complicated set of commands they can also be set to alternate left and right on the page, book style. Automatic page numbering is easy. And PeachText does not require that you add extra carriage returns between paragraphs to get a double spaced

THE REALLY
jazzy features of
PeachText are reserved
for form letters and
boilerplate text.

output. For some reason, WordStar and many other programs do.

By typing a backslash and an asterisk, you can enter nonprinting notes in your text. Commands embedded in the text can also be used to print out onscreen messages while a document is printing, or to develop online help menus of your own. You can get an online list of all these print commands, but it's only available during editing—not from the Print Screen, where you might also have occasion to need it.

Form Letters and Boilerplate

The really jazzy features of PeachText, though, are reserved for form letters and boilerplate text. Like Mailmerge and similar programs, PeachText allows you to create data files and merge them into a "personalized" form letter. For example, politician Emile Worthy might have a mailing list data file that lists his financial supporters. If he kept track of the amount and date of the supporter's latest contribution, a sample record might look something like this:

Giuseppe Goldblatt
1 Boysenberry Road
New Aachen
Maine
02040
\$150.00
020883

Such variables for a PeachText file are limited to 55 characters each. By embedding commands in a text file, Worthy could send a "personalized" letter to his constituents. The commands to print the

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name and address in *PeachText* would read something like this:

```
\:NAME\  
\:ADDR1\  
\:ADDR2\  
\:CITY\, \:STATE\ \:ZIP\
```

Math and Logic

PeachText can also perform certain arithmetic and logic functions. One way these can be used is to prevent a blank line from printing. For example, to keep *PeachText* from inserting a blank line for ADDR2 in the above example, the command in the third line above might be:

```
\IF NOT ADDR2="" , :ADDR2 , NL
```

This would tell *PeachText* to print the address line only if the line in the data file was not blank.

As mentioned earlier, a file can be divided into coded segments for inclusion in another file. This lets you prepare a file with various forms of boilerplate text and then include extracts from it in a longer letter. For example, you could give the following command:

```
\IF $CONTRIB"99.99" , B3
```

This would tell *PeachText* to include section B3 of the boilerplate document in this particular portion of the letter—but only for those bigwigs who gave more than \$100 the last time around. Cheapskates might get a letter that included section B4—which could tell them to cough it up or lose their friends down at City Hall.

Similarly, it would be possible to send a specialized letter to those contributors who haven't come up with cash in over a year. And the receivable department might find it fun to send progressively nastier notes each month to those slow-payers and deadbeats.

It's also possible to enter information from the keyboard at print time. For example, you could use the \GET command in conjunction with a couple of others to ask the user for today's data (once) and then the name, address, and salutation for each of a dozen letters.

PeachText offers so many options along these lines that it's impossible even to touch on them all. The manual even gives instructions that guide the expert in the use of a backward-feeding printer to produce double-column text—though it doesn't look easy. The manual also explains how to use data files to print

envelopes and three-across mailing labels. If these kinds of things are important to you, *PeachText* may well be the program you've been looking for.

Other Print Options

The only way you can preview how your text is going to look on paper is to invoke SCREENON from the Print Screen. This prints the text to the screen with line numbers at the left edge, and shows correct page and line breaks, underlining, and (on monochrome displays) boldface. Subscripts and superscripts are displayed with angle brackets, and in certain modes, column formats will be slightly awry.

This is handy for checking your copy before making a final printout. Unfortunately, switching back and forth between the print and edit modes can take a long time even when *PeachText* is running from a disk emulator, because the print formatter has to process your text each time. When you discover that your heading command isn't working or your paragraphs are breaking in an unpleasant way, you have to exit the print mode, enter the edit mode, and locate the problem before you can make a correction. The back-and-forthing can begin to seem interminable.

Print spooling (simultaneous printing while editing) is also available. This requires printing the file to disk from the Print Screen, then returning to the Edit

WITHOUT
*hesitation, I'd have to
call the manual the best
I've seen.*

Screen and invoking the Spool Print option.

Strangely, I can't find any easy way to link multiple files—chapters in a book, say—at print time. To print them out all at once, you apparently have to combine them in the editing process. Considering that linking files at print time is a standard option with most other word-processing programs, I find it a major omission. It's indicative of the *PeachText* orientation toward letters, short reports, and an office environment.



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OR AREAS

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PLAIN ENGLISH PROMPTS

NO

INDIVIDUAL COLUMN
WIDTHS

NO

EXTENSIVE FORMATTING
CAPABILITIES

NO

PROTECTED CELLS

NO

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NO

SORTING CAPABILITY

NO

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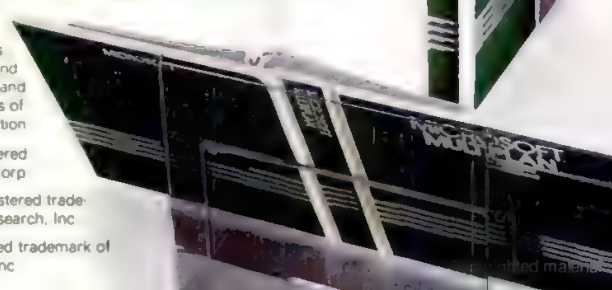
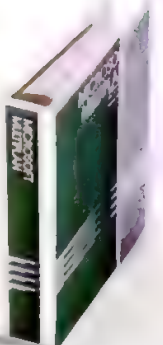
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Documentation

One more indication of this orientation is the manual. Without hesitation, I'd have to call it the best I've seen. In the familiar IBM format, it features a comprehensive index, as well as a complete list of error messages, a quick reference card, and a thick reference section that should solve most potential problems.

The manual uses a tutorial approach to get you up and running. PeachText provides a bunch of useful sample files on disk, and the documentation tells you with remarkable precision how to play with and learn from these files. The manual gives you samples of the screen display (in green) and indicates (in gray) the text that you are to manipulate. Because PeachText has kept commands to a minimum, it's easy to learn the basics.

It's fun, too. In the opening lessons, you help Abraham Lincoln revise The Gettysburg Address. His first draft, per PeachText, began, "It's great to be in Pennsylvania." You get to help Abe change it.

But the manual does include a number of irritating typographical errors. The worst is on page 4.51, where the instructions for embedding a footing command are given in two different ways—and they're both wrong!

The organization of the reference section could be better, too. The "Delete Right Blanks" and "Delete Left Blanks" entries are easy to find, but if you look up "Delete Sentence," you're told to "See 'Sentence Delete.'" I wouldn't care to hazard a guess why the "Line Width" and "Lines Per Inch" entries come between "Move Printer Backward" and "New Line." The index doesn't always refer you to the proper place for every command. And some of the print formatting commands require combinations. Getting all the information I needed to place a running head on the manuscript of this article wasn't easy.

Printer Problems

There's also insufficient advice about printers. If you're using an IBM dot matrix machine, you can relax. But a printer that doesn't respond to that particular set of codes is going to give strange results until you figure out what to do about them. While I was working with the tutorial, PeachText kept sending spurious T and H characters to my IDS Prism printer and gave strange results when I entered the



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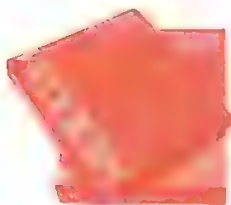
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FORMFEEDOFF command as instructed.

It turned out that I needed to edit a file called PRINTDFT to tell PeachText I was using what it considers a "Draft" printer. Where did I find this essential information? On the very last page of the manual!

Printer support with PeachText is a real puzzle. The manual recognizes only

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buying Peachtext, insist
that the dealer
guarantee that it will
work with your printer.

three types of printers: the IBM dot matrix, "draft" (other dot matrix), and "specialty" (daisy- and tulip-wheelers that can do incremental spacing). Supposedly, PeachText will be supplied with a special batch file called PTBAT that is customized for a particular printer and will install the proper control codes for it. Before buying PeachText, insist that the dealer guarantee that it will work with your printer. Control codes differ markedly among the various letter-quality printers, and what PTBAT can do to handle them is totally undocumented in the manual.

Those with non-IBM dot matrix printers would seem to be out of luck. PeachText does not even support superscripting and subscripting on such printers, and no patch or install program is offered to support special control codes for fancy printing. You can use a print command called \OUT followed by ASCII numeric codes to send those codes to your printer. That should help some, but you'll have to embed it in every document that needs the codes.

Odds and Ends

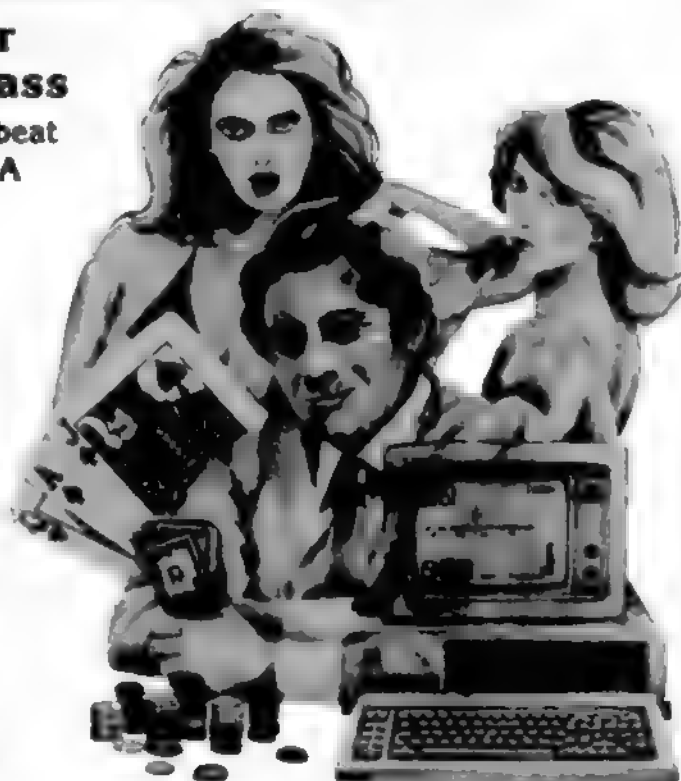
PeachText's error handling is excellent. I've never been able to cause a major problem, let alone a crash.

PeachText can be used as a program editor, but the manual specifically warns against using it for Microsoft BASIC. The problem involves lines longer than 80 characters.

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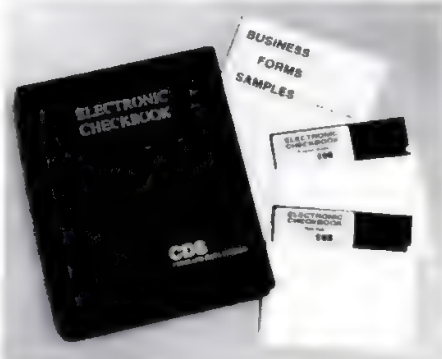


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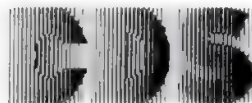
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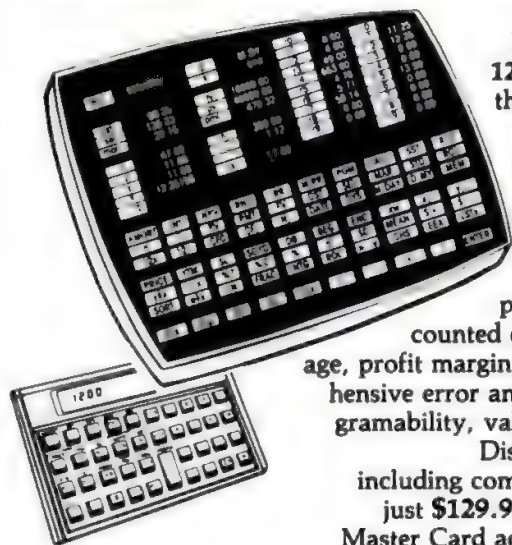


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Because they don't use control characters, **PeachText** files seem to be pure ASCII. This could make them very easy to communicate with a seven-bit protocol—though you might want to excise all those embedded print commands for people who don't use **PeachText**.

But **PeachText** lacks a number of features available elsewhere. For example, there's no decimal tabbing, which lets you align columns quickly and easily. Column move capabilities are also lacking. And **PeachText** will not let you scroll the screen horizontally past column 80 while editing. You can print up to column 132 if your printer will allow this, but entry of tabular material could be difficult.

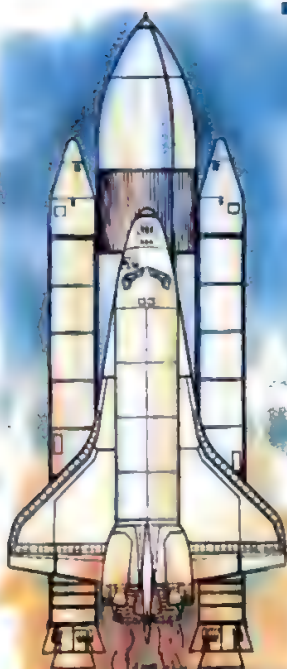
For specialized formats like movie and television scripts, using **PeachText** seems out of the question. The repeated changes of margination require an enhancer like **ProKey** to make even a screen-oriented program like **WordStar** perform these tasks well. With **PeachText**, the plethora of formatting commands required makes such tasks unthinkable.

Some people (I'm not among them) like to work with text that is double-spaced on the screen. I can't think of any easy way to do this with **PeachText**. And with no handy word, line, or page count available during text entry, and no character count except the grand total in memory, you are utterly in the dark when cutting text from the middle of a document in order to fit a limited space.

There are many other things you can't do with **PeachText**. Footnoting seems even more difficult than with **WordStar**, with which it's far from easy. The method suggested in the **PeachText** manual is totally unacceptable, since **PeachText** won't accept an underlining command. The **FinalWord** is the answer here; its multiple-windowing capability is another valuable item that **PeachText** lacks. You can't run a program from **PeachText**, either. To do that, you have to exit the program entirely and enter DOS.

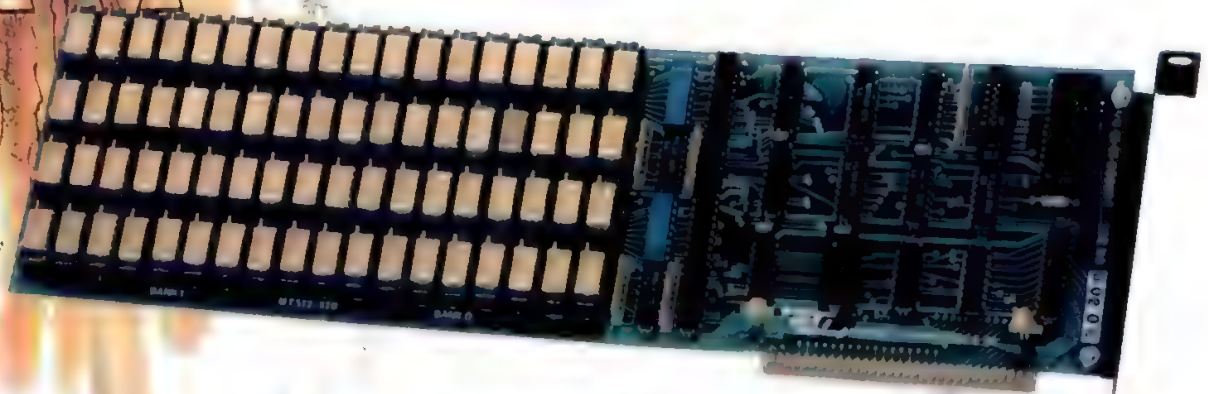
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Stephen Manes is a contributing editor for PC.



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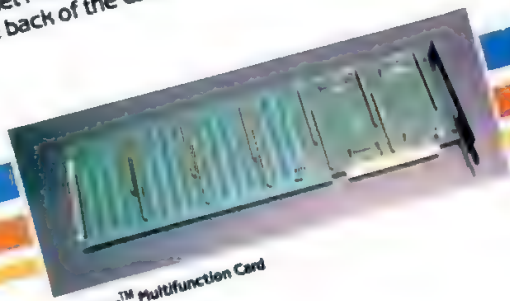
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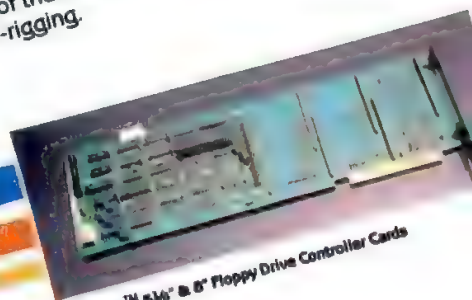
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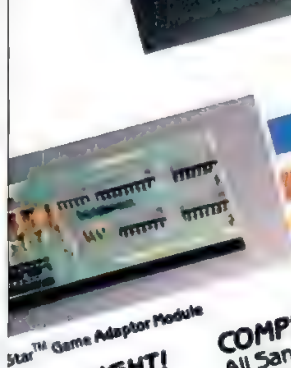
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The flexibility of the PC program set allows you to reassign ASCII codes to display and print characters upsidedown and backwards.

Exercising ASCII EXERCISING ASCII

Are you bored with the ordinary appearance of your text? Do you yearn for something completely different? How about a program that prints everything you write upside down or backwards? Don't turn the page just yet; there is a reason for trying such a program, for it will provide you with a glimpse into some of the more arcane workings of your PC.

There are certain principles you'll need to understand before you begin. With the color/graphics card installed, BASIC will work in two different modes, text and graphics. There is one version of text BASIC and two of graphics (medium resolution and high resolution). When you start up BASIC from DOS, you are automatically put into the text mode. To go

into the color/graphics mode, you use the Screen 1 (for medium resolution) or Screen 2 (for high resolution) commands. You can return to the text mode at any time by using the Screen 0 command. When in the text mode, a fully defined set of 256 characters is available from ROM. This character set is similar to the one used by the color graphics card, but there are important differences. The color graphics mode allows the programmer to create custom characters that replace part of the normal graphics character set.

Standard Codes in Text Mode

The PC character set includes the standard characters found in most microcomputers. Each character is assigned a

unique number so that the computer can identify digits, upper and lower case letters, and punctuation. Because this character set is standard, communication between computers and printers and other hardware is possible. The character code numbers form the American Standard Code for Information Interchange (ASCII); they extend from 0 to 127. For example, the character A is represented by ASCII code 65 on the Apple, the TRS-80, the Atari, and virtually every micro on the market.

But in the text mode above ASCII code 127, there are special character sets that vary in design and purpose from manufacturer to manufacturer. The IBM PC has assigned the code numbers from 128 to

Exercising ASCII

EXERCISING ASCII

255 to a variety of useful characters, including graphic-grid fragments, scientific notation symbols, foreign language characters, and foreign currency symbols. In the text mode, you can display any of these characters by using the Print command and the CHR\$() function. To display the Japanese Yen character, for example, simply type in and enter Print CHR\$(157). For the upper left-hand corner of a box, use PRINT CHR\$(218), or for a doubleline box, PRINT CHR\$(201).

The number inside the parentheses is, of course, the ASCII code for the character. Change the number to 65, and the letter A will be displayed. By using the CHR\$() function, it is possible to print foreign languages and mathematical formulas, and

construct boxes, grids, and even more complex shapes. All 256 characters are displayed on the screen in a two-dimensional grid of dots. The dot arrangements are contained in the PC ROM character generator.

Picture Elements in Graphics Mode

When you use the Screen 1 or Screen 2 command to enter the medium or high resolution graphics modes, something different happens. The screen becomes simply a field of dots, called pixels or pels (picture elements), measuring 320 by 200 in medium resolution or 640 by 200 in high. By turning individual pels on or off we can create complex graphic images. Since we

no longer have a rigid 80 by 25 screen designed to hold text characters only, the display of text is handled in a different, more flexible way.

Standard ASCII characters are "painted" onto the graphics screen. The grid in which the characters are created still measures 8 by 8, but the information used to display the letters doesn't come from the text ROM chip. Instead, it is in another part of the ROM area called the BIOS section. This information consists of a long table of bytes. (For more information, see the *IBM Technical Reference Manual*, pages A-75 to A-76.)

Each letter is defined by one group of eight bytes. In Figure 1, you can see how these eight bytes can form the letter F.

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When a 1 appears at a given position in the 8 by 8 grid, the corresponding pel is turned on. All of the standard characters from ASCII 0 to ASCII 127 are encoded and generated in this way.

What happens when you try to display characters above ASCII 127 in the graphics mode? If you use the `Print CHR$(157)` in an attempt to display the Yen sign, nothing appears on the screen. Those characters simply don't exist in the BIOS table. In fact, IBM has reserved the characters from 128 to 255 for user definition, so that you and I can create characters from our own byte table. But how do we create a new table and then let BASIC know that it is available?

To create a byte table you have to design each individual new character in its own 8 by 8 grid. The conventional way to do this is to plot the position of each pel on graph paper, then somehow put the characters into memory. To make it simple to use the set more than once, it is best to store the new character patterns in a binary data file. The labor involved in cre-

ating a new character set this way is considerable, and there are several commercial programs that make the design of character sets easy by letting you draw the

STANDARD ASCII characters are "painted" onto the graphics screen.

letters on a large grid on-screen, then automatically store the results in a file. In the accompanying examples, the PC will create two new character sets for you and handle all the dirty work.

Printing Backwards and Upside Down

The first set we create will be a copy of

all the standard characters, modified to display characters backwards on the screen. The second set will display characters upside down. Program 1 will generate the two character sets using the byte table information from the BIOS area, then store them in two binary files. Program 2 will load the tables from the binary files and display both sets in sequence, below the original character set. The final program will demonstrate how the character sets can be loaded in and used with a BASIC program.

Let's look at how the programs work. Program 1 creates the two character sets. Line 150 protects a segment of memory where we can store the new character sets. Line 170 gives the start and end addresses of the ASCII table. Lines 180-290 are loops that do two things: LOOP1 loads in each byte from the table located high up in segment &HF000. LOOP2 exchanges bits one and eight, two and seven, three and six, and four and five, as shown in Figure 2. Finally, LOOP1 stores the reversed byte in the new table.

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After the Reverse table has been created (see Figure 2), line 310 saves it in a binary file with the BSAVE command. In lines 360-460, we create the Upside-Down set using similar loops. For each letter, there is a table entry of eight bytes. To turn the letter upside down, we exchange bytes one and eight, two and seven, three and six, and four and five, as shown in Figure 3. This table is also saved as a separate binary file. Lines 260 and 440 put an animated character on the screen to reassure the user that something is happening while the tables are being created. The entire process takes several minutes to complete.

Before looking at the programs that use the new character tables, there are a few issues that must be raised about BASIC and memory. In the color/graphics mode, BASIC looks for a user-created table whenever it sees an ASCII code above 127. To know where to look, our program must provide the address where our table starts. First, we tell BASIC that we are working in Segment 0 of memory with the command DEF SEG=0. Then we can consult the *Technical Reference Manual*, which reveals on page 321 that BASIC will look at addresses &H007C-&H007F to find out where our table is stored.

Specific information must be put into each of four bytes. The first two bytes must contain the address of our table, which is &HC000 broken into two parts, &HC0 and &H00:

address &H007D — contents &HC0 = first byte of address
address &H007C — contents &H00 = second byte of address

The second two bytes must contain the address of the start of BASIC. We can copy that directly from another part of memory:

address &H007F — copy from the contents of address &H0511
address &H007E — copy from the contents of address &H0510

Once these pointers are set up, we reset the program to the normal BASIC segment with the command DEF SEG. Now, each time we use a character with ASCII code 128-255, BASIC will look up the correct customized character in the table.

Program 2 takes the sets we have created and displays them on-screen (see Figure 4). Lines 150-190 loop to show the

Figure 1: Character grid in graphics mode for standard character set.

hexcode	binary code	character grid
=====	=====	=====
&H62	01100010	
&H68	01101000	
&H78	01111000	
&H68	01101000	
&H60	01100000	
&HF0	11110000	
&H00	00000000	

"F" FROM THE GRAPHICS CHARACTER SET

Figure 2: Character grid in graphics mode for backwards character set.

hexcode	binary code	character grid
=====	=====	=====
&H7F	01111111	
&H46	01000110	
&H16	00010110	
&H17	00011110	
&H16	00010110	
&H06	00000110	
&H0F	00001111	
&H00	00000000	

"f" FROM THE GENERATED CHARACTERS

Figure 3: Character grid in graphics mode for upside-down character set.

hexcode	binary code	character grid
=====	=====	=====
&H00	00000000	
&HF0	11110000	
&H60	01100000	
&H68	01101000	
&H78	01111000	
&H68	01101000	
&H62	01100010	
&HFE	11111110	

"L" FROM THE GENERATED CHARACTERS

@0♥♦♣♠•□◻▶◀↑↓!!¶§=±†‡→! " # \$ % & '
 () * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O
 P Q R S T U V W X Y Z [\] ^ _ ` a b c d e f g h i j k l m n o p q r s t u v w
 x y z { | } ~ Δ
 @0♥♦♣♠•□◻▶◀↑↓!!¶§=±†‡→! " # \$ % & '
) (* + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O
 P Q R S T U V W X Y Z [\] ^ _ ` a b c d e f g h i j k l m n o p q r s t u v w
 x y z { | } ~ Δ
 @0♥♦♣♠•□◻▶◀↑↓!!¶§=±†‡→! " # \$ % & '
) (* + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O
 P Q R S T U V W X Y Z [\] ^ _ ` a b c d e f g h i j k l m n o p q r s t u v w
 x y z { | } ~ Δ

type a phrase and push return

:IBMPC: Upside Down & Backwards

IBMPC: Upside Down & Backwards
IBMPC: Upside Down & Backwards
IBMPC: Upside Down & Backwards

push any key to continue:

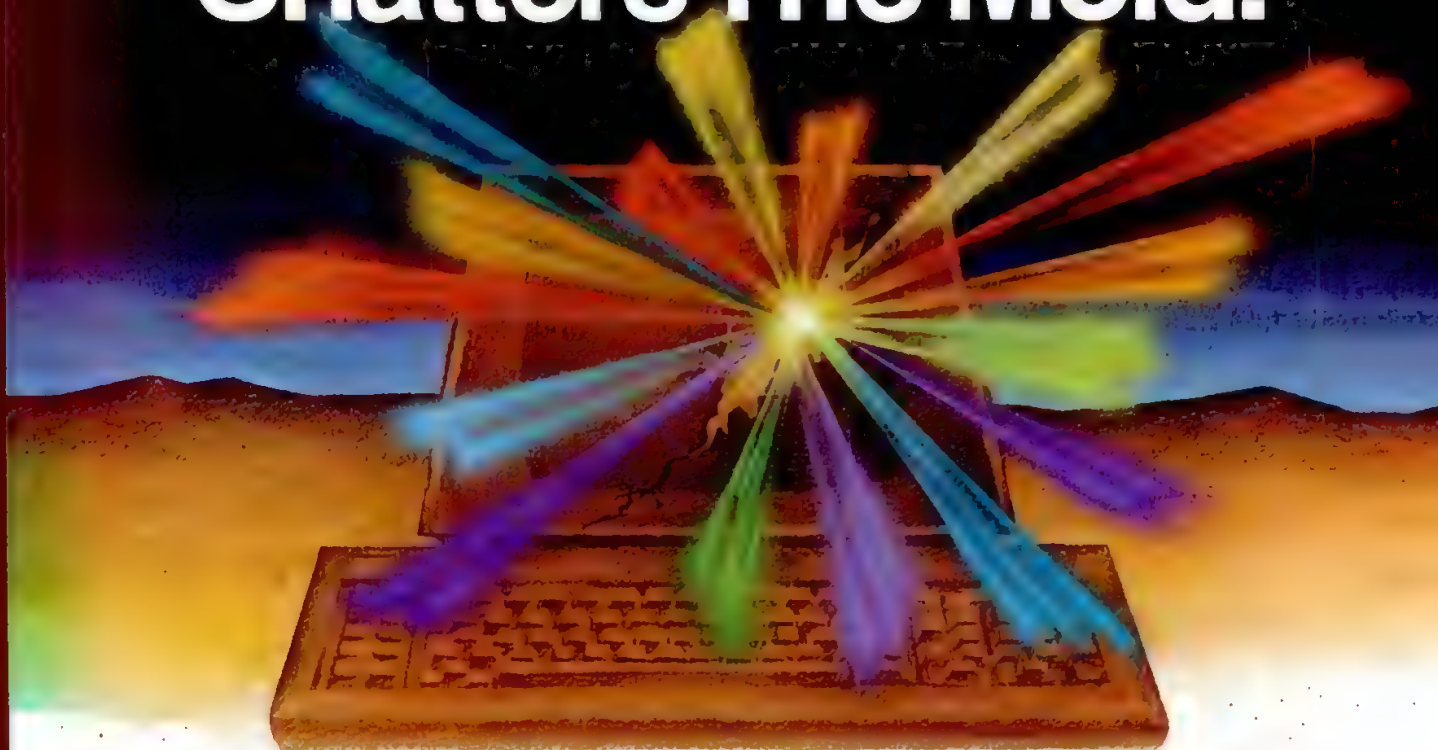


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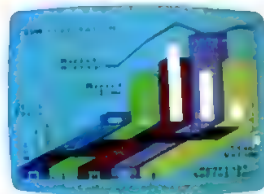
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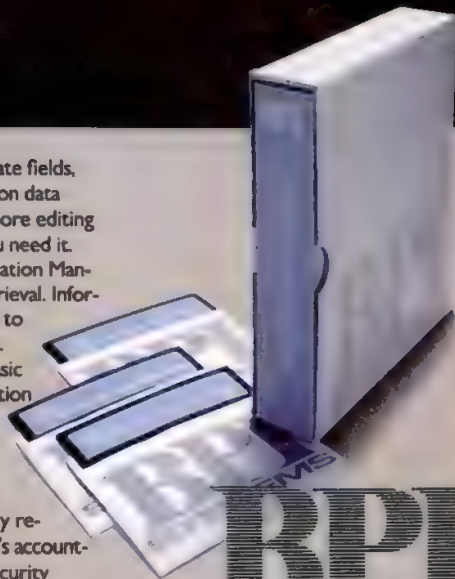
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normal character set. CHR\$ does bizarre things when certain ASCII codes are used, so we put dots on the screen to replace those characters. Line 210 protects memory above &HC000. Lines 220-250 tell BASIC where our new character sets can be found. We load the BACKWARD.DAT binary file into memory in line 270 and display it with the loop from line 280 to

WHAT HAPPENS when you try to display characters above ASCII 127 in the graphics mode?

line 300. Then we load the Upside-Down character set into the same section of memory and display it in lines 320-450.

Program 3 demonstrates how the character tables can be used by letting you enter a phrase and then see it displayed in the backwards and upside-down alphabet characters (see Figure 5). First, we protect memory in line 140. Then we load both tables into protected memory in line 150, one at &HC000 and the other at &HC400. The pointers are set to look at the start of the table in lines 160-190.

The program then lets you enter a phrase up to 30 characters long. Lines 290-320 redisplay the original text. Lines 330-360 confirm that the Backward table is being pointed to, then loop through to display the message. As the phrase is displayed one character at a time, line 150 of the program adds 128 to the ASCII value of each letter to find its equivalent in the new table. Next, the table pointer is set to the Upside-Down table in Line 370. The loop that follows in lines 380-400 displays the phrase with upside-down characters. Finally, the program loops back to line 210, where a new phrase may be entered or END may be typed to stop the program.

Reminders

There are three important things to remember when creating your own customized character table. First, put the table in a protected area of memory. Second, set up the proper pointers so BASIC can find the new table. Third, store it in a

Character Set Programs

These programs will enable you to create the upside-down and backward character sets illustrated in this article.

Program 1: To create new character sets

```
100 REM MAKESETS.BAS - John Schnell - 1983
110 REM create new character sets
120 SCREEN 1 : KEY OFF : COLOR 1 : CLS
130 LOCATE 10,7.0 : PRINT " CREATING NEW CHARACTER SETS"
140 LOCATE 12,4 : PRINT " this will take about five minutes "
150 CLEAR, &HC000
160 REM create BACKWARD table
170 ASCII.TABLE.START=&HFAGE.ASCII.TABLE.END=&HFEG0.REVERSE.SET.PTR.&HC000
180 FOR LOOP1 = ASCII.TABLE.START TO ASCII.TABLE.END
190   DEF SEG = &HF000
200   BYTE = PEEK(LOOP1)
210   DEF SEG
220   REVERSE.BYTE = 0
230   FOR LOOP2 = 0 TO 7
240     IF BYTE AND 2*LOOP2 THEN REVERSE.BYTE = REVERSE.BYTE + 2*(7-LOOP2)
250   NEXT LOOP2
260   LOCATE 18,19:IF LOOP1 AND 1 THEN PRINT "\0/" ELSE PRINT "/0/"
270   POKE REVERSE.SET.PTR,REVERSE.BYTE
280   REVERSE.SET.PTR = REVERSE.SET.PTR + 1
290 NEXT LOOP1
300 REM save new set to binary file
310 BSAVE "BACKWARD.DAT",&HC000,&H400
320 LOCATE 17,10 : PRINT " new BACKWARD set saved "
330 BEEP
340 REM create UPSIDE-DOWN table
350 UPSIDEDOWN.SET.PTR=&HC000
360 FOR LOOP1 = ASCII.TABLE.START TO ASCII.TABLE.END STEP 8
370   FOR LOOP2 = 0 TO 3
380     DEF SEG = &HF000
390     HIGH.BYTES = PEEK(LOOP1+7-LOOP2)
400     LOW.BYTES = PEEK(LOOP1+LOOP2)
410     DEF SEG
420     POKE UPSIDEDOWN.SET.PTR+7-LOOP2, LOW.BYTES
430     POKE UPSIDEDOWN.SET.PTR+ LOOP2,HIGH.BYTES
440     LOCATE 18,19 : IF LOOP2 AND 2 THEN PRINT "\0/" ELSE PRINT "/0/"
450   NEXT LOOP2 : UPSIDEDOWN.SET.PTR = UPSIDEDOWN.SET.PTR + 8
460 NEXT LOOP1
470 REM save new set to binary file
480 BSAVE "UPSIDOWN.DAT",&HC000,&H400
490 LOCATE 19,8 : PRINT " new UPSIDE-DOWN set saved "
500 BEEP : END
```

Program 2: To display all three character sets

```
100 REM SHOWSETS.BAS - John Schnell - 1983
110 REM display all three character sets
120 SCREEN 1 : KEY OFF : COLOR 1 : CLS
130 REM show the normal character set
140 FOR LOOP1 = 0 TO 127
150   IF LOOP1=7 THEN PRINT " ":GOTO 190
160   IF LOOP1>8 AND LOOP1<14 THEN PRINT " ":GOTO 190
170   IF LOOP1>26 AND LOOP1<32 THEN PRINT " ":GOTO 190
180 PRINT CHR$(LOOP1);
190 NEXT LOOP1:PRINT:PRINT
200 REM protect memory and set pointers to new character sets
210 DEF SEG : CLEAR, &HC000
220 DEF SEG = 0
230 POKE &H7C,&H0 : POKE&H7D,&HCO
240 POKE &H7E,PEEK(&H810) : POKE &H7F,PEEK(&H811)
250 DEF SEG
260 REM load and show BACKWARD character set
270 BLOAD "BACKWARD.DAT",&HC000
280 FOR LOOP1 = 128 TO 255
290   PRINT CHR$(LOOP1);
300 NEXT LOOP1:PRINT:PRINT
310 REM load and show UPSIDE-DOWN character set
320 BLOAD "UPSIDOWN.DAT",&HC000
330 FOR LOOP1 = 128 TO 255
340   PRINT CHR$(LOOP1);
350 NEXT LOOP1:PRINT:PRINT
360 END
```


Program 3: To demonstrate switching character sets

```
100 REM DEMOSETS.BAS - John Schnell - 1983
110 REM demonstrate switching character sets
120 SCREEN 1 : KEY OFF : COLOR 1 : CLS
130 REM protect memory, set pointers, and load BOTH character sets
140 DEF SEG : CLEAR, &HC000
150 BLOAD "BACKWARD.DAT", &HC000 : BLOAD "UPSIDOWN.DAT", &HC400
160 DEF SEG = 0
170 POKE &H7C,0 : POKE &H7D,0
180 POKE &H7E,PEEK(&H810):POKE &H7F, PEEK(&H811)
190 DEF SEG
200 REM input user phrase and display NORMAL, BACKWARDS, and UPSIDE-DOWN
210 CLS
220 LOCATE 25,14
230 PRINT "type END to stop";
240 LOCATE 2,8 : PRINT "type a phrase and push return"
250 LOCATE 4,1
260 INPUT "": PHRASE$
270 IF PHRASE$ = "end" OR PHRASE$ = "END" THEN 450
280 IF LEN(PHRASE$) > 30 THEN BEEP : CLS : LOCATE 1,10 :
PRINT "too long, try again" : GOTO 220
290 LOCATE 9,1:PRINT " ";
300 FOR LOOP1 = 1 TO LEN(PHRASE$)
310 PRINT CHR$(ASC(MID$(PHRASE$,LOOP1,1)));
320 NEXT LOOP1:PRINT:PRINT " ";
330 DEF SEG = 0:POKE &H7D,&HCO:DEF SEG
340 FOR LOOP1 = 1 TO LEN(PHRASE$)
350 PRINT CHR$(ASC(MID$(PHRASE$,LOOP1,1))+128);
360 NEXT LOOP1:PRINT:PRINT " ";
370 DEF SEG = 0:POKE &H7D,&HC4:DEF SEG
380 FOR LOOP1 = 1 TO LEN(PHRASE$)
390 PRINT CHR$(ASC(MID$(PHRASE$,LOOP1,1))+128);
400 NEXT LOOP1
410 LOCATE 25,9 : PRINT "push any key to continue.";
420 PAUSE$=INPUT$(1)
430 GOTO 210
440 NEXT LOOP1
450 END
```

binary file so it can be reloaded easily. You can load many tables into protected memory at the same time and use each of them with a simple change of the pointer at location &H007E.

You may want to change the programs illustrated here to create your own character sets. It wouldn't be difficult, for instance, to devise a reverse video set of the standard characters, or an italic set, or one that simply put odd curves and shapes on the screen as a sort of graphics shape alphabet. If you did create such a shape alphabet, you could actually enter patterns and designs on-screen from the keyboard.

Even if you don't feel the need to experiment, you might find some purposes for the programs demonstrated here. You could use them as an attention-getting device to point out errors, or for an opening title screen. You can create the impression that your letters are standing on a mirror, for instance. And all such unusual character screens can be captured and printed by using a printer screen dump program. /PC

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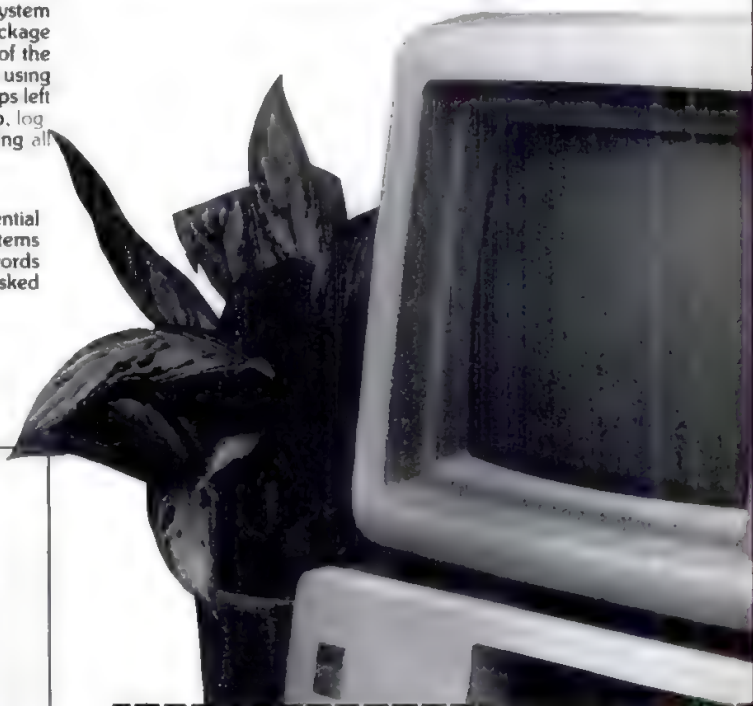
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MEMORY/LOUIS WARNER

For most PC users, stuffing RAM chips is a routine, problem-free procedure. If, however, you want to err on the side of extreme caution, here are a few tips.

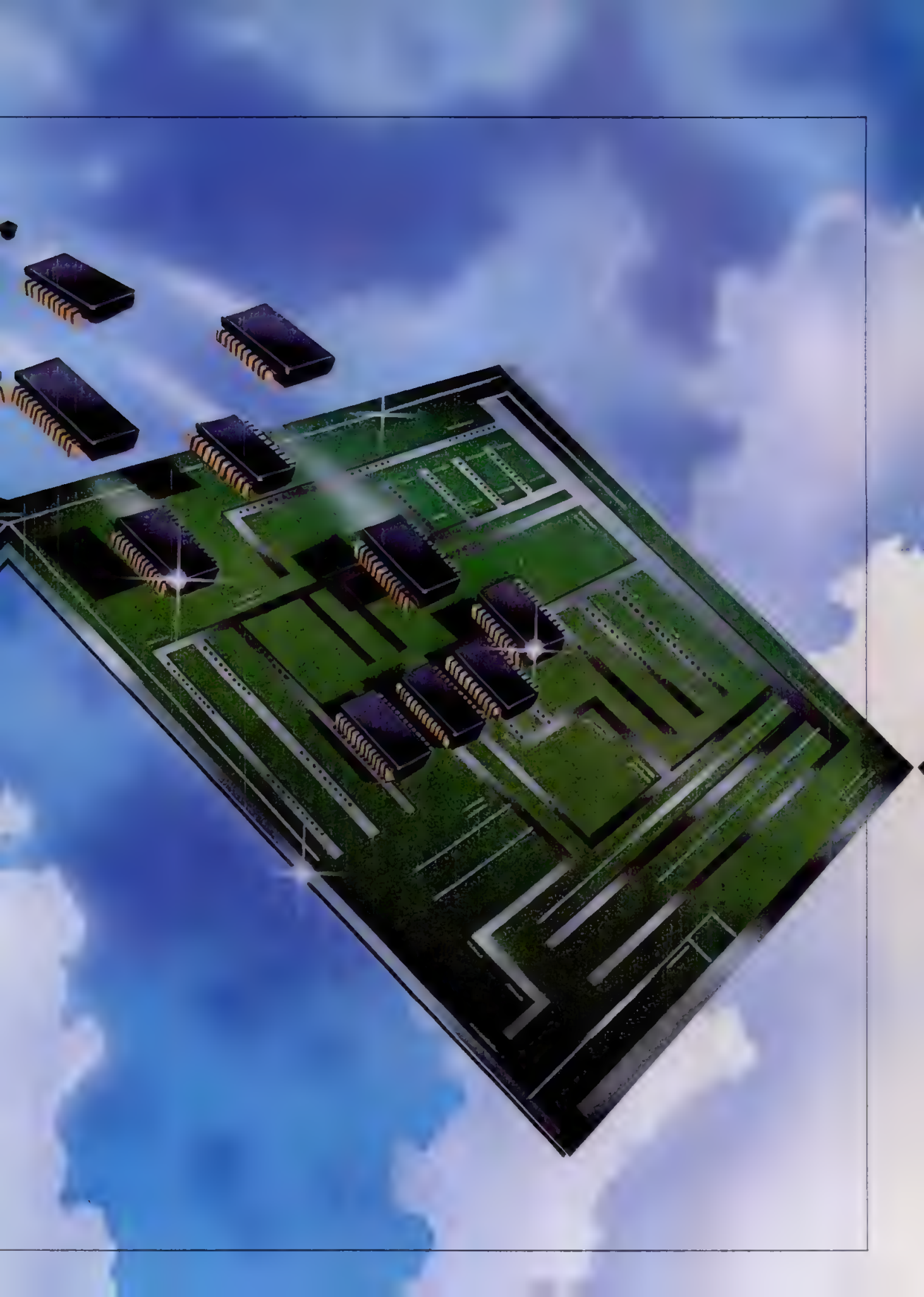
MASTERING MEMORY CHIPS

Feeding your PC an additional load of little black centipede-like memory chips may be the most important thing you can do to enhance your computer's capabilities. Although the basic PC unit is equipped with at least 64K, many applications packages will not run on fewer than 128K or even 256K. Devices such as software spoolers and electronic "RAM disks" can use all the chips you can cram inside—up to 640K.

If the thought of installing those delicate little electronic flakes makes you nervous, relax. You're merely experiencing the "I've never done this sort of thing before" sweat, the same condition your father probably experienced the first time he set out to replace a bad vacuum tube in the family Philco. Actually, the procedure is fairly simple if you exercise caution and keep a few important facts in mind.

Fresh Chips

First of all, buy your chips from a reputable source. Many memory board manufacturers sell chips they certify as proper for their boards; others list specifications for purchase from outside sources. Many of the chips are date-coded. You might find that fresher chips have been subjected to less handling and are less likely to have been damaged in the process.



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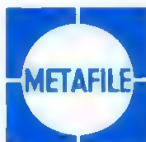
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Make certain the chips you do buy are properly packaged.

The first precaution before you begin stuffing RAM into your memory board is: "Not so fast!" Don't unpack those chips yet! Memory chips are very easily damaged by static electricity. Static electricity lurks everywhere, and I'm not talking about major snaps, crackles, and pops—just a silent zap that can send a good chip to the scrap heap. Before you insert that first chip, you must take several precautions to reduce the amount of static in the air.

First, remember that static electricity hates humidity but loves nylon and synthetics. If you or anyone else in the room is wearing nylon clothing, including underwear, you're going to have to strip—or at least change into a natural cotton fabric. Remove slippers or shoes with synthetic soles; their sliding action generates static. Keep a kettle of water boiling to raise the humidity level slightly, and use a spray bottle filled with water to lightly mist you, your clothing, the floor, and the chair seat (especially if it's plastic). Work in an uncluttered room or in a room without carpeting. And finally, don't forget to read over your owner's manual and other instruction books to be sure you understand the steps required for your particular system board or expansion card.

Setting Up the Operating Room

Before you begin surgery, make sure you have a large sheet of aluminum foil, a vacuum cleaner, a flashlight, some light hobby tools, a magnifier, and a pad and pencil. After you've gotten your equipment together, unplug the power cable and remove connecting cables from the PC. Next, remove the cover. There are two screws at the lower edge of the back panel (if necessary, consult your PC owner's manual for a diagram). Slide the cover forward and lift it up slightly to remove. Gently vacuum the fan and the inlet areas in the interior of the computer, being careful not to stir up any dust in the room. If you wish, you can also wipe the fan blades with a small brush.

Remove the rear hold-down screw from the expansion board and gently remove the board from the bus socket. You should pull the card straight up, taking care not to damage the gold-plated connections. Place the piece of aluminum foil

flat on the table and touch it occasionally while you work on the chips to avoid getting a shock. If you have a battery-powered device on the board, such as a clock, remove the battery. Now you're ready to begin.

Inserting the Chips

Place the expansion board on the aluminum foil. Unwrap your chips and place them pins down on the foil. Locate the

MEMORY
*chips are very easily
damaged by static
electricity.*

indentation, notch, or other marking on one end of the chip top; this denotes the number one pin end of the chip. To determine on which end of the socket the chip should be inserted, look at the other chips on the board or read the instructions that accompany your board. Note that some boards have covers over the unused sockets and that these must be removed carefully.

Most likely, the pins on the underside of the chips taper outward slightly. Squeeze the pins together gently until they become parallel. Or you can press the sides of the pins gently against the table to bring each row into line. Then carefully set the chip onto the socket in the correct direction. Inspect the chip and socket with your magnifying glass to see that the pins line up properly with the contact holes. If they do, use your thumbs to gently but firmly press the chip into the socket. (Special chip insertion and removal tools can also be used.)

Using the magnifier, inspect the chip to see that all of the pins have been grabbed by the socket and that none have been folded under. Repeat the process for the other eight chips in each 64K bank. (The PC uses eight chips for memory and one for parity check for each 64K of RAM.)

The Moment of Truth

When you've finished stuffing one set of 64K, stop and run a test to make sure your PC is running properly. If you have

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made an error or if you have purchased a defective chip, it's better to discover the problem now rather than after all the chips have been installed. Begin the test by resetting the switches on the PC motherboard to account for the memory you've just added. (Consult the PC manual or the manual that came with your memory board for the proper setting and procedure.) Next, plug in the power card and install the necessary operating cables. Now, the moment of truth—install the DOS disk in the A drive and turn on the power. If you don't hear that reassuring beep right away, don't panic. The PC goes through a routine of self-diagnostic tests before it begins its work. For example, if you've installed a set of 256K RAM chips, it could take a full minute before the all-clear is sounded. On the other hand, if you don't hear the beep at all, or if the sequence of beeps and disk grinds differs from what you expect to hear (consult your user's manual again), you may have a problem. Write down any error message that appears on the screen. If your memory expansion card contains little "parity lights," note their condition, then shut off the power.

Frequent Flubs

If you've followed each step of the installation procedure to the letter, but

WHEN
*swapping chips, don't
overdo it! Memory
board sockets are not
designed for wear and
tear.*

your PC refuses to run properly, don't be discouraged. What went wrong? Well, perhaps the switches on the system board were set improperly. Have you accounted for all of your PC memory, including the system board, other expansion boards, a CP/M adapter with memory, or other devices? Check your arithmetic, then recheck your switch settings. There are two sets of switches, and there are left-to-right and up-and-down positions to con-

sider.

Have you installed the memory board properly? Check the contacts to make sure they are correctly aligned with the PC expansion slot. Also, check the cables to make sure you've installed them properly. Perhaps you've disturbed an internal cable on the PC; one of the ribbon cables from the disk adapter, for example.

You might have a defective memory expansion board. Check for cracks or breaks in the printed circuit or solder joints. You have plugged the computer in, haven't you?

Testing Chips

If you have investigated all the possibilities, but you still can't discover the problem, perhaps one of your chips is defective. If you have spare chips on hand, try switching a few at a time into the new bank of chips. If the circuit passes the test, you can assume that one of the chips you've removed is faulty. To isolate the faulty one, insert the suspect chips one at a time until the RAM circuit fails again.

If you don't have any extra chips, insert two or three of the new chips at a time into a working RAM circuit until you isolate the bad chip. Be sure to change the switch settings beforehand if you're reducing the number of chips in your isolation testing. Also keep in mind that some memory boards have the first bank of 64K soldered firmly into place. And remember: when swapping chips, don't overdo it! Memory board sockets are not designed for wear and tear.

Burning In the Circuit

It's possible that you might finish the testing procedure without finding a bad chip. Assuming you've installed the chips and the memory board properly and you've set the computer switches correctly, the problem may be a transitory one—a glitch that shows up only under certain conditions or only momentarily. If the computer seems to be working, leave the power on for several hours or longer; manufacturers call this "burning in" a circuit. If the problem returns, try the isolation procedure again. But remember, if it's not broken don't fix it!

Happy stuffing.

/PC

Louis A. Warner is an engineer in Woodbridge, Connecticut.



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Data Design works with a 128K IBM PC with double-sided drives and supports hard disks.

Experts predict a \$1 billion market for educational software by 1987. Programmers must become students, though, before they can teach computers to teach.

The Blossoming Of Computer Aided Instruction

During the 1960s, parents who sat with their children at kitchen tables across the nation puzzling over the "new math" were collectively bewildered by the strange, spare notations of number systems and set theory. They may have been dismayed by their inability to decipher a ten-year-old's homework. But that was only the beginning. When it comes to computers, it seems that it's never too early to introduce a child. For, unlike their parents, children are often more curious than apprehensive.

Today, the use of computers in schools is increasing at an impressive rate. Children may go from math classes to BASIC classes where, as often as not, the computer itself, in tandem with appropriate software, acts as the teacher. Not only are students learning about computers on computers, but the PCs are used to improve skills in science, reading, and language, to name a few subject areas.

The educational software market is not limited to the classroom. Chances are that the student who wants to finish his long division assignment at home on the family PC will have to distract a parent bent over the keyboard learning French or polishing rusty typing skills. For, in addition to being a tool for word processing, record

keeping, and budget management, the PC is a natural for computer assisted instruction (CAI).

A Bright Future for CAI

If the numbers are an indication, the CAI market will grow by leaps and bounds over the next 5 years, despite a shortage of

quality software today. In a comprehensive report on the educational software market, the Dallas market research firm of Future Computing Inc. projects a phenomenal compound annual growth rate of 71 percent for CAI programs. A \$70 million market in 1982, the market will just graze the billion dollar mark by 1987. The study

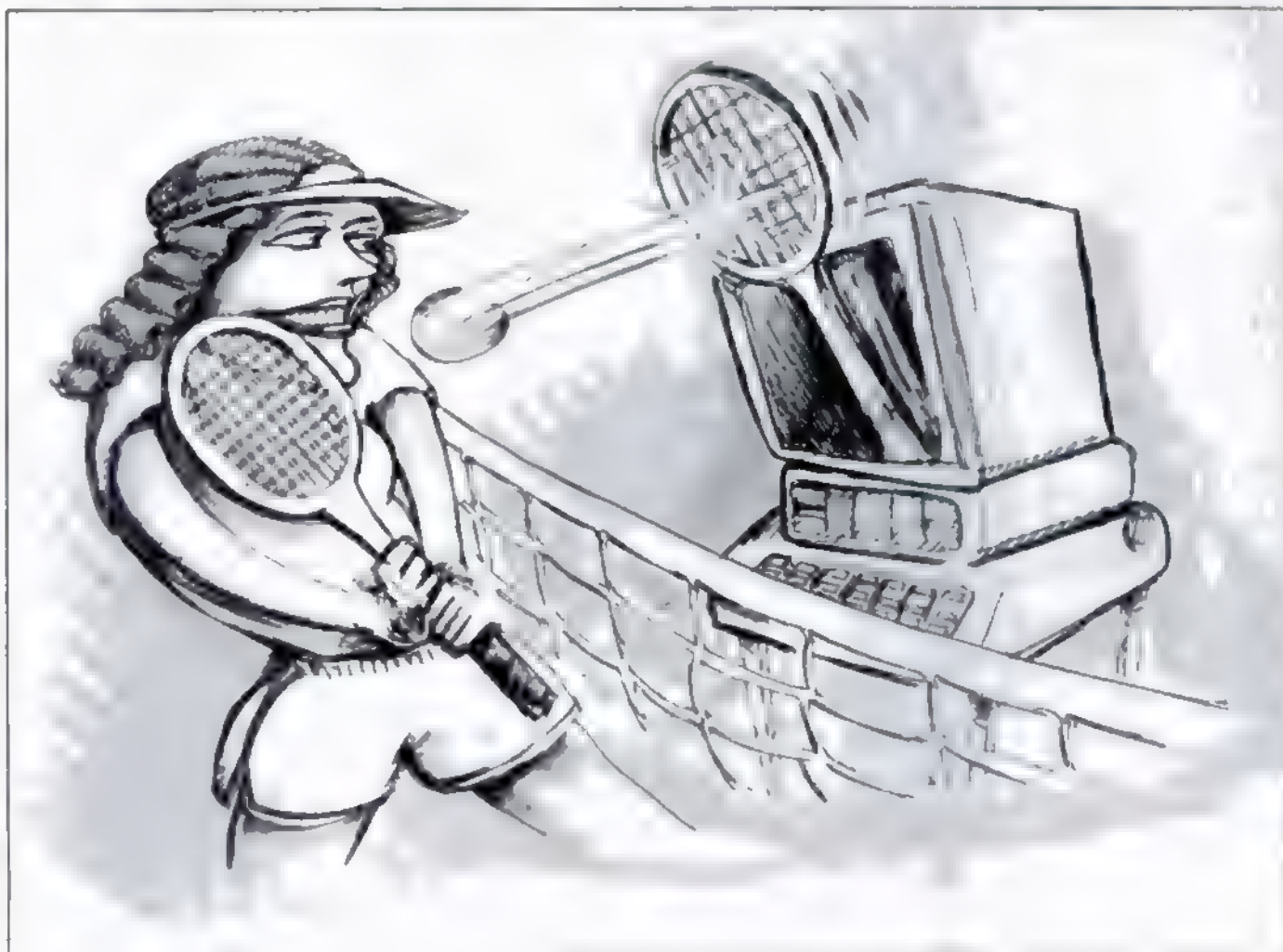
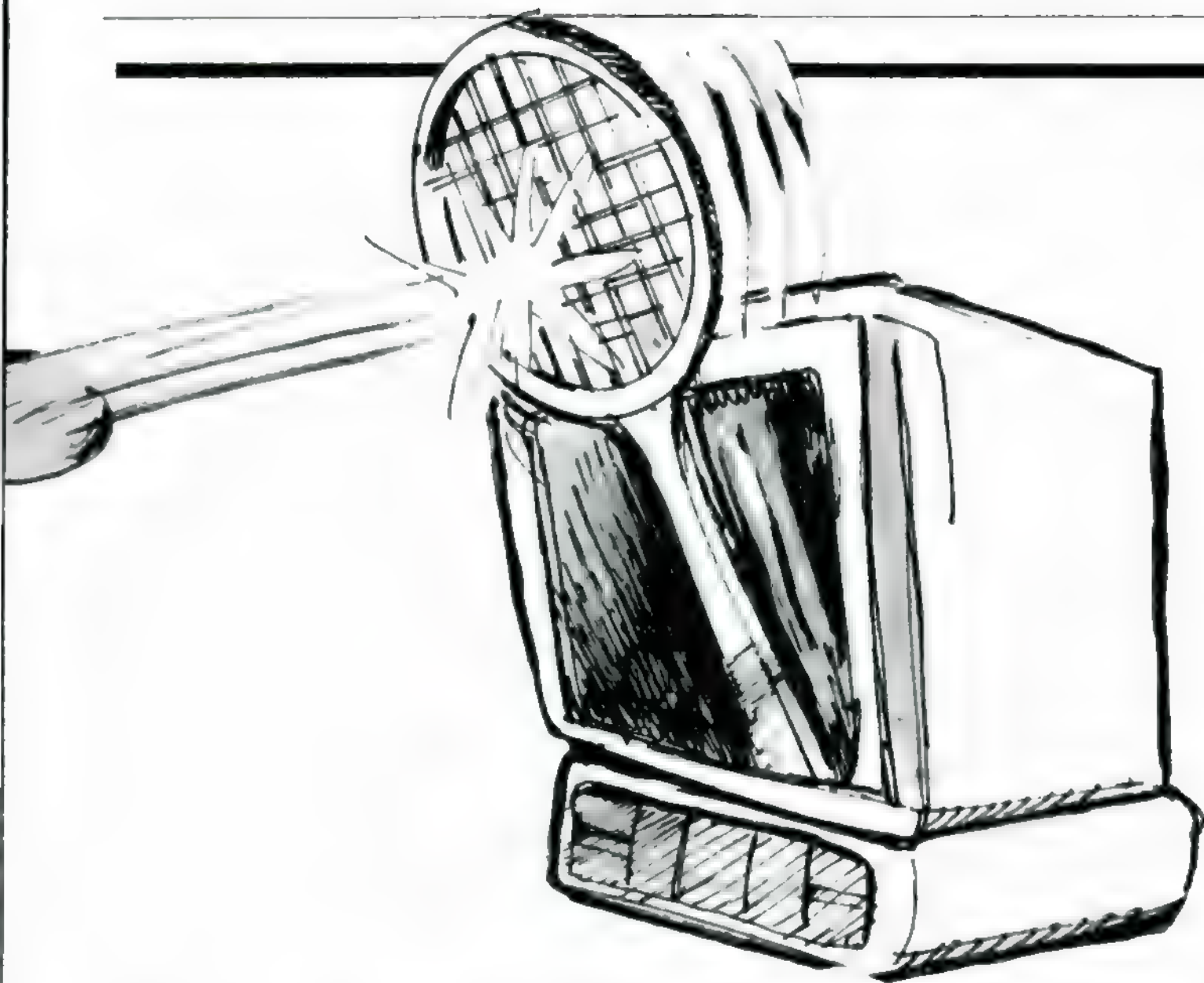


Illustration: Don Day



predicts that during this period, sales of "courseware," will increase from 2.3 million units to an astounding 34 million units. In the coming months the ranks of courseware developers are likely to swell.

Monitoring the Trend

According to a recent study by A. R. Molnar, a researcher who compiled the results of 59 independent computer-based instruction studies, computer aided instruction produced significantly better results than conventional methods of in-

struction at all levels of proficiency. Molnar also determined that computer aided instruction inspired greater interest among students in their courses, an absolute prerequisite to improved learning results. Moreover, CAI students learned the course material in two-thirds the time that it took students who relied strictly on conventional methods. CAI was faster, resulted in higher scores, and was better received than traditional classroom instruction.

Innovative Uses

The computer's ability to mimic real life suggests countless uses for CAI. Designers of airline pilot training programs have long known its advantages. Using computer-based flight simulators, fledgling pilots can reproduce convincing flight conditions without ever leaving the ground. The time, expense, and potential danger of test flights are minimized.

A chemistry teacher may be reluctant to allow his students to work with volatile chemicals in the lab, fearing an explosive reaction. A computer can simulate the properties of chemicals and the possible mixtures while the student observes, protected from danger until he understands the principles involved.

Management as a science has become an important trend in recent years, and the computer can be used effectively in its

study. For example, a supervisor who is learning management techniques may "talk" to a computer that has been programmed to play the role of a disgruntled subordinate. The computer simulates a dialogue by presenting the problem at hand, offers a series of possible responses or solutions to that problem, and evaluates each response. The supervisor learns

WHY ISN'T the computer more effective as an educational tool?

management techniques and theory through this dialogue, without actually tying up a second role player.

There are other innovative uses for the computer in training and education. A PC can prepare students for standardized exams such as the SAT or the law boards. It can teach word processing or speed reading. In the guise of an arcade-like game it can present the principles of reasoning and organization. With so many possibilities, why isn't the computer more effective as an educational tool?

Courseware Does the Teaching

The computer is an extremely capable delivery device, but by itself that's all it is. The *sine qua non* of CAI is software—or courseware—which drives the computer and does the teaching. Today, the shortage of acceptable courseware hinders the effectiveness of computer aided instruction.

It has been estimated that about 5 percent of all software written for personal computers is courseware. However, many industry experts believe that only a fraction of that courseware is effective. The quality of the courseware that is available now ranges from soporific to exciting programs that use the computer creatively.

A Cottage Industry

Courseware development is largely a cottage industry made up of mom and pop operations. No single software manufacturer dominates the market.

The successful developer must be pro-

IN THE
coming months the
ranks of courseware
developers are likely to
swell.

struction. A typical student participating in a computer-based course achieved scores 10 to 15 percent higher than those achieved by students in traditional learning environments.

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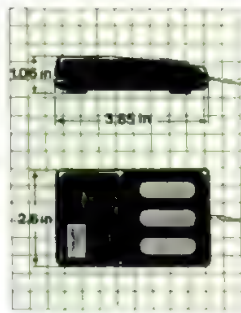
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CIRCLE 161 ON READER SERVICE CARD

ducer, director, and stage manager. He must plan programs thoughtfully, always keeping the needs of the intended user in mind. And he must pay meticulous attention to detail.

There are two essential guidelines for courseware developers: logic and good sense. The product will fall flat if it is not coherent, efficient, and easy to use. This means that the instructions must be clear and well written. All bugs, glitches, and grammatical errors must be ironed out. Imagine, for example, the confusion that a misplaced decimal point in a mathematical equation could cause.

A well-conceived educational program encourages the student to interact with it. It focuses on the best answer, and offers a pat on the back when the student responds correctly. It never causes the student to question his own ability.

The unique capabilities of the computer can be a creative gold mine for the courseware developer. Whenever appropriate, the program should feature graphics, sound, and special effects (but not at the expense of its objectives). An astute courseware developer could play off the recent video game craze by designing courseware to evoke the challenge, competition, and fantasy of the best of the games. A program that is stimulating and creative makes learning seem effortless.

Perhaps most important, a courseware program must be instructionally sound,

THE SHORTAGE
of acceptable
courseware hinders the
effectiveness of
computer aided
instruction.

which can be a tall order for a developer who knows little of the principles of education. Basically, it means that the courseware has been produced systematically using a four-step process: analysis, design, development, and evaluation.

Analysis

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CIRCLE 231 ON READER SERVICE CARD

er must establish that there is a need for the proposed courseware. He sets goals for the program simply by deciding what the user should be able to do after completing the course. The goals then become the building blocks for the program. It is helpful to state these goals clearly in the documentation that will accompany the program. It is difficult to spend too much time in this early analysis. A hastily conceived program will probably be doomed to sit on a shelf collecting dust.

COURSEWARE
development is largely a cottage industry made up of mom and pop operations.

At this time, the developer should identify for both the students and the instructors those prerequisite skills that are called for by the program. Like the program goals, these educational prerequisites should be displayed prominently in the documentation.

Design

Development moves into the design phase, in which the delivery system characteristics will be selected. The designers consider precisely the interaction of text, color, graphics, and sound, and they budget resources to best serve the program.

A disk is a unique medium to work with, and the program designers must allocate space carefully. For example, they must decide how many graphics frames to use, given that graphics require up to 4,000 bytes while text frames might only require 250.

A team approach works well during design. The team should consist of a subject matter expert (SME), who monitors the content of the program; an instructional designer, who specializes in learning theory and its application to instructional programs; a system analyst, to determine the feasibility of developing and implementing the program; and a graphic artist, who sets the visual tone of the program and designs its graphics.

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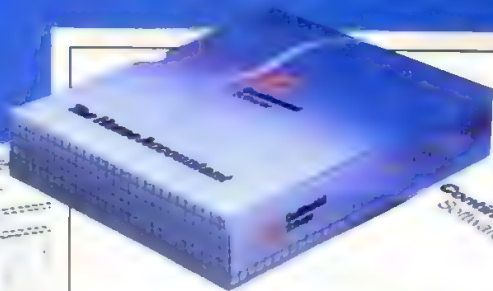
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CIRCLE 364 ON READER SERVICE CARD

The course outline takes final shape during the design phase. The outline is essential, as it sets the order that the lessons will follow. It is imperative that the lessons be properly sequenced to build on each other. Poor judgement here can seriously undermine the program. For instance, a student who has not yet grasped

Educational prerequisites should be displayed prominently in the documentation.

the concept of "borrowing" will have difficulty subtracting four-digit numbers. Courseware that attempts to teach subtraction must therefore introduce borrowing early on, or list it as a prerequisite.

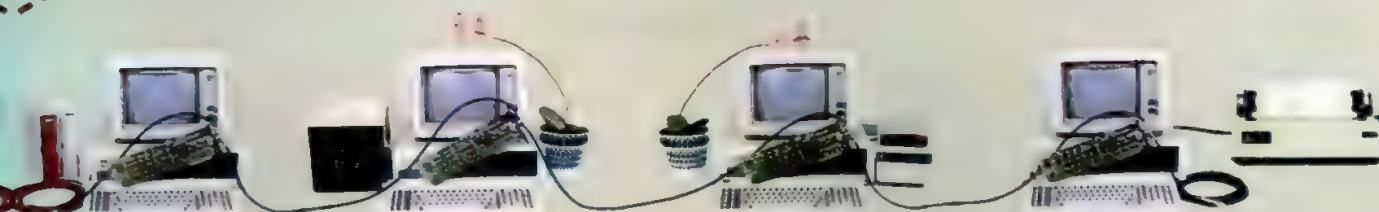
Once a sequence has been established, critical content and teaching strategies are specified. Analyzing critical content determines the concepts a student must master in order to meet each lesson's objective. This means, for example, that if the lesson calls for completion of a 1040 tax form, each step for filing out the form must be specified. The teaching strategies determine the methods that will be used to present the material. A specific strategy might teach students the procedures for printing text that they have used a word processing program to write or edit. Teaching the distinctions between mammals and reptiles would require a different strategy.

The design team finalizes the number and content of instructional examples and exercises in the program. It also decides how much control to give the learner. The most successful programs allow the learner to pace himself by controlling the segment of the instruction he views. He can jump from one lesson to another, from topic to topic, or he can even bypass the exercises entirely if he feels confident about the material.

Practice examples and learner control are essential parts of an instructional program. It is not surprising, therefore, that in reviews of educational software the programs that receive the poorest ratings consistently lack these features.

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The pace quickens during the development phase, which is when the instructional material actually is written and programmed. Good, effective courseware designers adhere closely to the learning and programming guidelines established in the design phase. They prepare introductory and connecting texts, which include introductions and objectives for the lessons, a clear and precise statement of the core information, and explicit instructions that lead the student through the lessons. Instructions can be written into the program proper or enclosed as printed matter. Either way, instructions must be as clear and complete as possible.

Evaluation

During the final evaluation, the designers test and revise the courseware. They troubleshoot persistent bugs and glitches and identify other errors. The results of any field testing that has been done are assessed. Did students do well in the course? If not, how can the program be modified or strengthened?

A courseware development team may make the mistake of downplaying the need to evaluate its finished product. Weary perhaps of meetings and repeated revisions, the team members decide to release the program and let it stand on its own merits. This is imprudent, as a seemingly insignificant change in an instruction or definition, ordered after a final review, can often improve a program significantly.

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Richard Walker and Dann Bergmann are manager and assistant manager respectively of electronic publishing at Courseware Inc. Dr. Walker's roundup of educational software appeared in PC, Volume 1 Number 8.

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You may not have to study botany to understand how DOS 2.0 works with IBM's new fixed disk, but it helps to know something about trees.

BRANCHING OUT WITH THE IBM FIXED DISK

Of all the interesting hardware and software that IBM announced in March when it unveiled the new Personal Computer XT, easily the most interesting is the new 10-megabyte hard disk storage system. Hard disk systems for PCs aren't anything new. A glance through the ads in any recent issue of PC Magazine reveals that quite a few different hard disks have been available for the PC, in different prices, sizes, and styles.

Hard disks are the big brother of floppy disks, the very big brother. The idea is the same: a rotating platter coated with magnetic material, data stored in concentric circles called tracks, and so forth. The dimensions, however, are very different. Hard disks use a rigid metal platter rather than a flexible piece of plastic, making it possible to store data at a higher density, which allows a much greater storage capacity. The rigid platter also allows the disk to spin faster, resulting in much quicker access to the data. Depending upon how many disk surfaces are used, and how high the recording density is, the capacity of different hard disk systems for the PC ranges from a low of about 5 megabytes (5,000,000 characters), to a high of about 25 megabytes. The most popular sizes seem to be 5 and 10, and 10 mega-

bytes is the size that IBM chose for its own fixed disk.

Design Limitations

Most hard disk systems make use of a technology that was first code-named "Winchester" when it was a secret new product at IBM, years ago. Winchester technology requires a tightly controlled environment, which means a sealed case enclosing the disks. Because they are sealed, the disks on a Winchester system can't be removed. While a floppy disk drive can access an unlimited amount of data (by changing disks), a Winchester hard disk is restricted to a fixed capacity. Although a hard disk will hold much more than a single floppy disk, you must manage the space on a hard disk system more carefully, since the space limit is intractable.

There are, however, hard disk systems with removable cartridges; these cartridge disks do not implement true Winchester technology, but their speed and capacity is in the same ballpark. Cartridge hard disks offer most of the best of both floppies and Winchesters: high speed, high capacity, and unlimited off-line storage. But IBM's hard disk system is a true Winchester; it is not removable.

You'll notice that different terms—hard disks, Winchester disks, fixed

disks—are used interchangeably. Until you become familiar with details that distinguish a hard disk from a Winchester, or a Winchester from a fixed disk, these terms refer to the same thing: high speed, high capacity disk storage. IBM prefers to use the term “fixed disk” for its new PC equipment.

Fixed vs. Electronic

The IBM 10-megabyte disk holds the equivalent of over 60 single-sided floppy disks, or over 30 double-sided disks. Chances are, your total library of programs and data amount to less than this. In rough terms, a hard disk is about five or ten times faster than a conventional disk. In contrast, using memory to simulate a floppy disk—what’s called a RAM disk, or electronic disk—is about twice as fast as a hard disk system.

Since electronic disks have become very popular, it’s natural to ask if a hard disk obviates the need for an electronic disk. The answer is yes, even though an electronic disk is twice as fast. To understand why, you need to understand the idea of a bottleneck. If one component of a computer system is very slow compared to the rest of the system, it is the bottleneck that limits the over-all working speed of the computer. If that one part is brought up to a speed comparable to the rest of the system, the bottleneck is eliminated. But if that one part is sped up still further, the proportional improvement is small. This is because the system is using its various parts in a balanced proportion; every part

much extra advantage. If you are using an electronic disk, adding a hard disk will result in about the same speed. If you are buying a hard disk, don’t invest in the extra memory needed for an electronic disk; it will probably be a waste of money.

Inside the IBM Fixed Disk Drive

The IBM system is the same size as the floppy disk drives, so it fits into the same slot. The power needs are quite a bit higher, which explains why you cannot slide IBM’s fixed disk into your PC; it has to be put into the expansion unit. The new XT, which features a heavier power supply, can handle a fixed disk inside its regular case.

The fixed disk case contains two platters, so there are four recording surfaces. While the standard PC disk has 40 tracks (or concentric circles of recorded data), the fixed disk has 306 tracks with 17 sectors on each track. Floppy disks have eight sectors (nine sectors optional with DOS 2.0). The sector size remains the same: 512 bytes. It’s interesting that IBM chose to retain the sector size of the floppies. Inasmuch as the DOS 2.0 and the hard disk require more memory, IBM could have switched to a larger sector size. Keeping the same sector size, however, reduces the risk of any software incompatibility.

Doing a little arithmetic, 512 bytes per sector, 17 sectors per track, 306 tracks per side, and four sides to the disks, yields a raw capacity of 10,653,696 bytes. The operating system itself consumes some of this capacity, but unlike floppy disks, its appetite varies. Consequently, no exact figure can be quoted for the working capacity of the disk. IBM therefore quotes a conservative estimate of 10,240,000 bytes, or 10 megabytes in round numbers.

Both the PC and the PC-XT can accommodate one or two hard disks, thereby increasing potential capacity to 20 megabytes. On the original floppy system, the drives are known as A, B, C, and D, depending on how many you have (up to four). But with the hard disks, the first hard disk is always drive C, even if you don’t have an A or a B floppy disk. The first floppy disk is A, and the optional second is B; the first hard disk is C, the optional second is D. The reason for this lies in the problem of booting your system, and some changes to ROM.

More specifically, a hard disk system

creates a small problem for booting, or starting up the operating system. Under most circumstances you’ll want to keep your operating system on the hard disk, and just boot from it. But to maintain flexibility, and to be able to run stand-alone programs like the Microsoft Flight Simulator, you have to be able to boot from the floppy disk as well. IBM solved this problem by making a change to the Read-Only-Memory, or ROM, routines.

THE NEW ROM includes a change in the start-up routine for booting.

In the PC-XT, the new ROM includes a change in the start-up routine for booting. The ROM program tries first to read a start-up (boot) record, from disk drive A. If drive A cannot be read, then the procedure is applied to hard disk drive C. If neither A nor C can be read, the cassette BASIC system goes into action, just as with the original PC when you boot it up without a disk ready in drive A. This means that to boot from the hard disk, you have to make sure that you don’t already have a disk in the A drive.

The PC-XT comes with the new ROM. A hard-disk expansion unit for the original PC includes the new ROM in an easy-to-install kit.

Besides the problem of booting the system, there is a second, and sneakier, reason why there is a new ROM for the new disk. While IBM is being very benevolent to the PC marketplace in general, when it wants the territory to itself, it will go after it with its legendary predatory tactics. By introducing its hard disk with supporting changes to ROM, and a very smart, though rather expensive, disk controller board IBM has made it much more difficult for other hard disk sellers to compete for a share of the PC market. Although the new version of DOS is very receptive to the addition of non-IBM devices, including hard disks, IBM’s support of its own hard disk gives it a real advantage that other

WINCHESTER
*technology requires a
highly controlled
environment.*

would have to be sped up to significantly improve the whole.

In personal computers, including the PC, floppy disks have caused most bottlenecks. Anything that increases the speed of disk access improves the effective speed of the whole computer. Either a hard disk or an electronic disk will do the job. Installing both, however, will not gain

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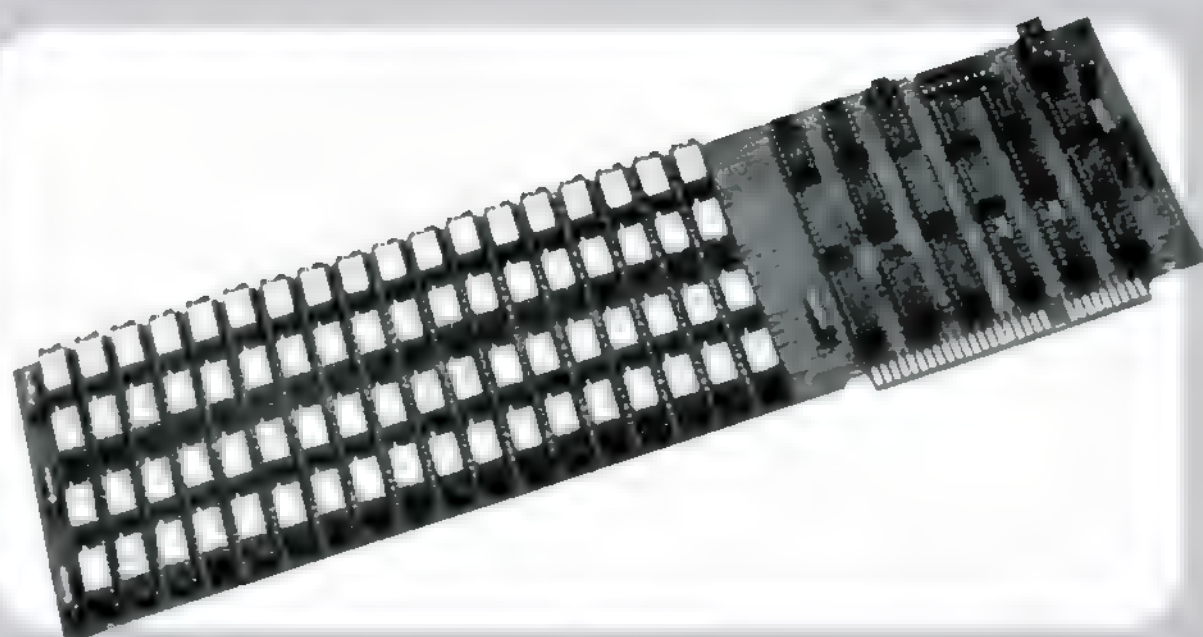
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Branching Out

So far I've focused on the new disk system, but the fact is that DOS 2.0-based software support for the IBM fixed disk drive is the most interesting part of story. Rather than leaping into the middle of the new DOS disk features, let's sneak up on them by looking at what the problems are with using a hard disk.

Ordinary floppy disks have been able to hold up to 64 files for single-sided disks, and 112 files for double-sided. Trying to keep track of this many files can be a

***IBM HAS MADE
it more difficult for
other hard disk sellers to
compete for a share of
the PC market.***

problem. If you ask for a DIR directory listing on a disk with 50 or more files, you'll have a hard time spotting the ones you are looking for. Even with a sorted directory listing, which you can get with the new DOS 2.0 "pipeline filters," it isn't easy to isolate one set of files from another. Of course, we have always been able to code our file names to group files by category, but this makes it difficult to give files good, recognizable names.

If this is something of a problem with floppy disks, imagine the problem with a hard disk with 30 times as much capacity. A directory listing of 3,000 files might turn out to be a little inconvenient. So something had to be done to make all those files manageable. IBM's solution was "tree-structured directories."

The basic idea of tree-structured directories is very simple. Normally a file directory lists only files. With DOS 2.0, the entry in a file directory may be the name of another directory. And that directory can have other directories under it. Each directory may contain files, other directories, or both, in any combination. Each disk device, hard disk or floppy, requires a master or root directory. This directory may also contain files and subdirectories. Since this whole business can fan out,

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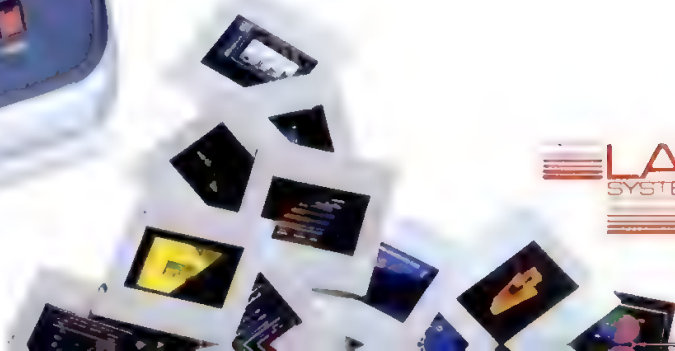
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with each directory containing several files and directories spreading out from it, the layout has come to be called a "tree-structure." The files are the leaves; the subdirectories are the branches.

When you format a fixed or floppy disk, its normal root directory is created automatically. Subdirectories, however, remain under your control. DOS 2.0 contains commands to create or delete directories. Fancier stuff, such as moving a directory from one place to another, isn't provided.

In the old days we got to files (and programs, which reside in files) by specifying the drive slot such as B:. If the file we wanted was in the current default device, then we could leave that part off; and when we wanted, we could change the default device. The same approach applies to the new directory trees, with appropriate twists. Before we look at the details, though, let's consider what we did in the past in a new light.

Remembrance of Things Past

Whenever we inserted the disk drive identification in front of a file name, or changed the default device, we usually thought of it in just those terms: We were specifying the disk drive to be used. But there is another way to look at what we were doing. By specifying disk drive, we were telling DOS where to look for the directory that contained our files. From a functional point of view, we weren't really specifying the device, we were specifying the file directory; it's just that in the old days, devices and directories matched one-to-one, so we never saw a distinction.

Now, with the tree structure, you can assign several directories to a disk drive. This makes us aware that what we're really interested in is which directory contains our files; the question, "What drive slot?" is just a part of the question of "what directory?"

How do you identify which directory is to be used? It's more complicated than identifying a disk device, for two reasons. One is that while disk devices have terse one-letter identifiers, subdirectories allow real names, which can be as long as 11 characters. (Subdirectories have names to identify them, but each disk volume's root directory doesn't have or need a name, since specifying the drive slot identifies it's root directory.) The other reason why

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identifying a directory is more complicated than identifying a disk device, is that the tree structure of directories might have several steps from the root to the directory we want. The term path is used to describe the chain of directories under directories that might be needed to find our way to a particular directory. A path is a list of directory names, with reverse-slashes to punctuate it: \ TOP-LEVEL \ MIDDLE \ BOTTOM \.

Using a path name like this leads you to any files in a directory named BOTTOM. Naturally, this path would only work if MIDDLE is a directory under the

directory named TOP-LEVEL, and so forth.

For all practical purposes, these path names are used just in the same way as the disk device identifiers you are used to, but they are more tiresome to type in. Just as there is a default device, which we can change with a command, there is also a default path, which can also be changed, independently. From a practical point of view, the default path is more important than the default device, since it's so laborious to key-in a lengthy path name.

All of this subdirectory and path name business will work on floppy disks, but it

is really intended just for hard disk use. There are two reasons for this. One is that there is much less need for subdirectories on a floppy disk since the storage capacity is so much smaller. The other reason relates to timing. Processing paths and subdirectories require much more disk access than ordinary directories do, particularly, more grinding from track to track. This makes it much less practical to use subdirectories on floppy disks. (In fact, many disk operations, such as the CHKDSK command, are much more time-consuming in the 2.0 version of DOS. This

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WITH DOS 2.0
*there
 is little or no
 reason to
 partition the disk
 at all—with one
 exception.*

is one reason why many PC users who don't buy the IBM hard disk won't be tempted to switch to DOS 2.0).

Inside the Organization

Given this background, let's look at how hard disk storage can be organized. First, we need to consider partitioning. When you partition a disk, you subdivide it into distinct parts, each of which has its own dedicated storage space. When this is done, each partition acts like a separate disk device. Typically, a hard disk is partitioned to make up exact replicas of the space available on a floppy disk; this approach is used to make the fixed disk more compatible with software that assumes it's working with floppies.

With previous non-IBM hard disk systems, partitioning was common, but with DOS 2.0 there is little or no reason to partition the disk at all—with one exception. The one exception is if you plan to use another operating system that doesn't support hard disk in the same way as DOS; for example, if you use CP/M-86 or the p-system. For these alternate operating systems, you can get the speed advantage of



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hard disk, with floppy compatibility, by creating a floppy-like partition on your hard disk.

Except for this one need, the natural way to manage space on a fixed disk using DOS 2.0 is to treat all the space on the disk as a huge open pool shared by all the files on the disk. This avoids one of the problems of partitioning, specifically, a space shortage in one partition, while others have space to spare.

The key to organizing the files on a fixed disk lies in a sensible choice of paths and subdirectories. There are many many ways to organize, and many ways to make

a mess of it, so you'll need to proceed with care. What's best is going to depend heavily on the nature of your own data, but here are some suggestions that ought to work for most people.

Avoid complicated tree structures. It is likely that all you will ever need is one level of subdirectory under the hard disk root directory. At that second level, you can have one separate directory for each distinctly different subject. For example, if you have programming tools—compilers, program libraries, the DOS linker—you might place them all in one directory. If you use an accounting system, you

might put all the programs and data into one common directory, or perhaps two: one for data and one for the programs. If several people are using the same disk, each should have a directory for his individual data, while programs and common data remain in their natural directories.

DON'T FORGET to haul out the trash once a week.

Keep the standard DOS programs and your most frequently used programs in the root directory, rather than in a subdirectory. If you can commonly work with some default subdirectory, but need programs or data that reside in another directory, you may set up batch files to take care of the path accesses. And if you have space to spare, you can place separate copies of a frequently used program in several subdirectories. If you keep your correspondence on a hard disk, you might keep current letters in your master correspondence directory (which should be immediately below the disk's root directory), but move old letters into subdirectories under the main letter directory.

These suggestions only scratch the surface of what you might want to do with subdirectories on a hard disk, but they should give you some good ideas for building a system that suits your particular needs.

The Edge of Space

If you don't think that you could run out of space on a 10-megabyte hard disk, you've forgotten the variation of a classic rule, "Data expands to fill the allotted space." If you don't have 10 million bytes of data now, you probably will soon after you get a hard disk system. Much of it may turn out to be garbage, so one of the first rules of hard disk space management is "Don't forget to haul out the trash once a week." When this solution no longer does the trick, put the things you no longer use "in the attic," meaning off-line storage, or more specifically, floppy disks.

If you get to the point where tossing out the old or little-used data still doesn't remove your space problem, and you can't

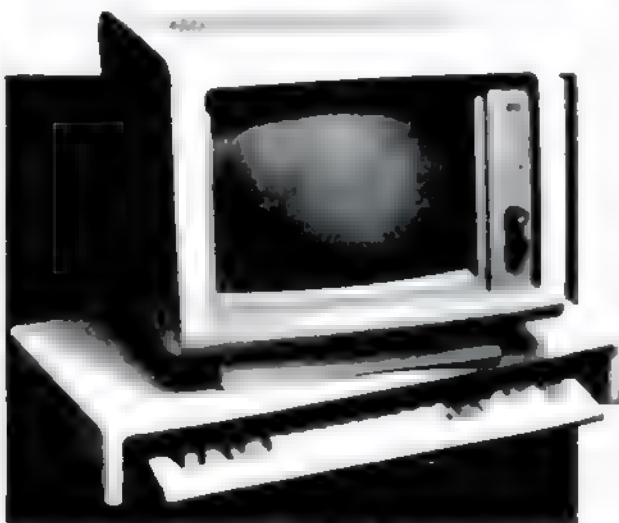


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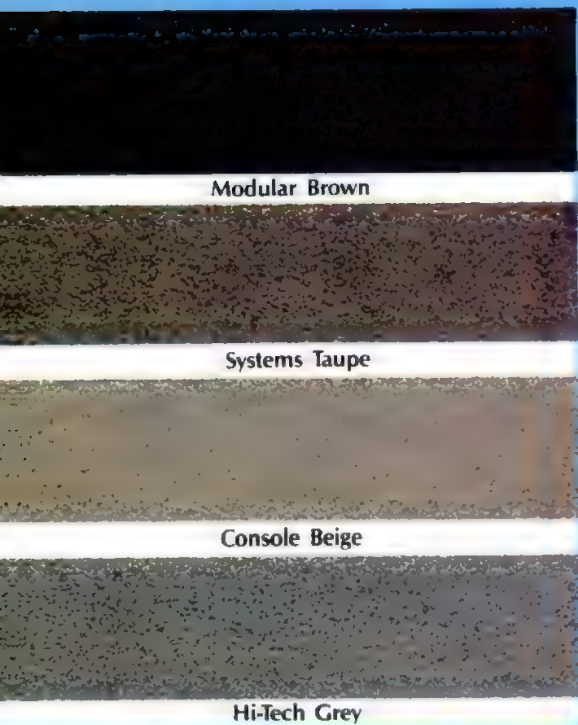
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get another hard disk, then you have to assign priorities to your data. What requires fast access and what doesn't? If you tend to start up some program, such as a VisiCalc spreadsheet, or a dBase II data base, and continue using it on lots of different data, you would be better to keep the data on the hard disk, and the program on a floppy disk.

That last and messiest subject that we come to in discussing the hard disk is the knotty problem of copy-protected programs. Copy protection has always been a mess, and hard disk systems only make the matter more complicated. The need to transport programs to hard disk is sure to put unprotected programs at a competitive advantage. Consequently, we may see fewer protected programs. There are also rumors of an IBM program designed to move some copy-protected programs to hard disk, and still keep them protected. Those programs that remain unmovable will have to be loaded off of floppy disk. At least for the programs that run under DOS, you should be able to keep your data on the hard disk. The real villain programs

COPY
protection has always
been a mess, hard disks
make the matter
more complicated.

in this story are the ones that don't run under DOS, but require rebooting the system to use them. You won't be able to put even the data from these programs onto hard disk unless the programs are custom-tailored.

The IBM fixed disk system is barely a month old. There will be much more to say about it as it becomes more familiar to users. We can be confident that it will advance computer capability for users who need greater file capacity and faster access. But like all new technology, it will require a period of adjustment. /PC

Peter Norton is the author of the Norton Utilities programs, and Inside the IBM/PC, published by Brady. He lives in Venice, California.



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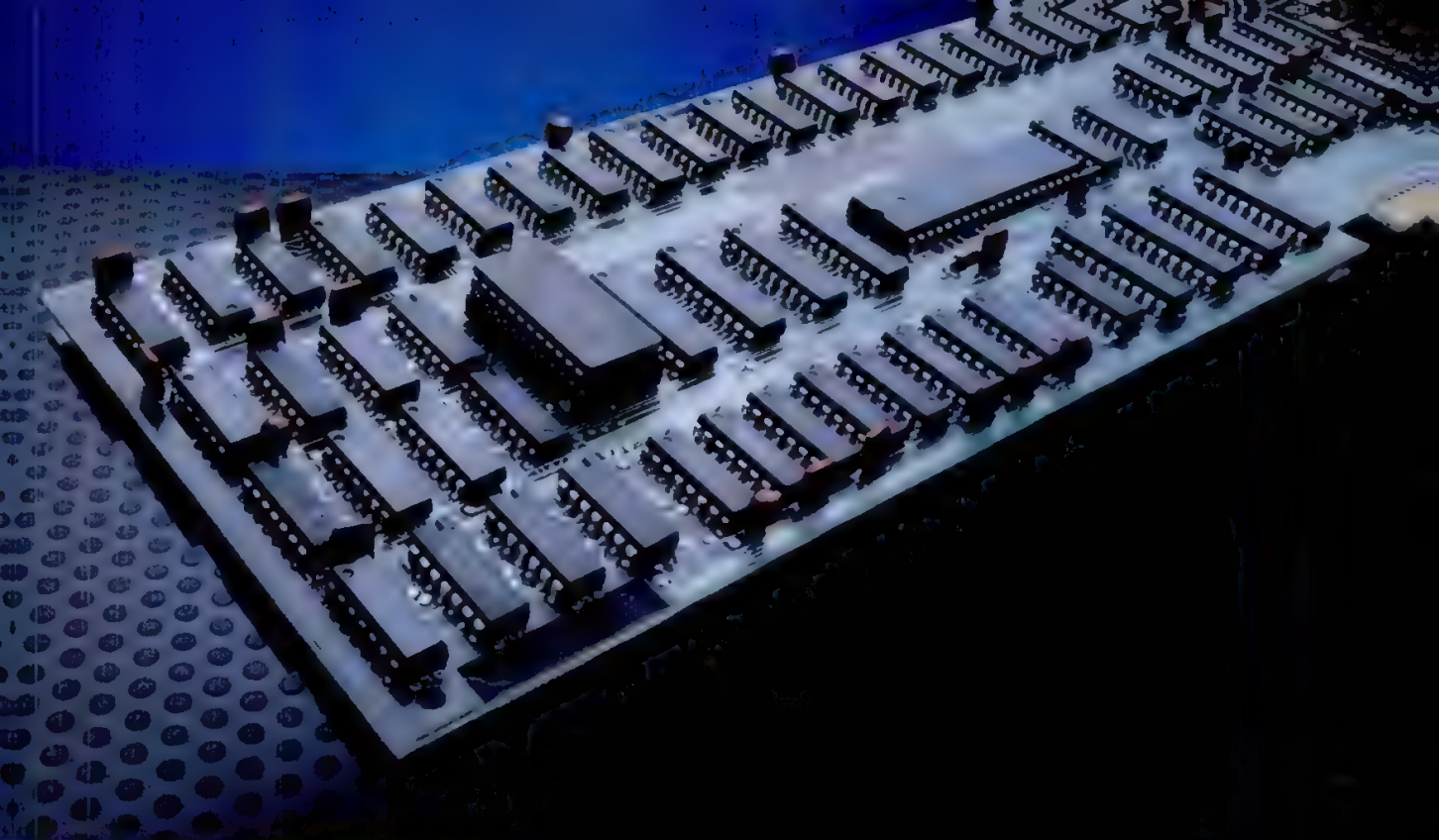
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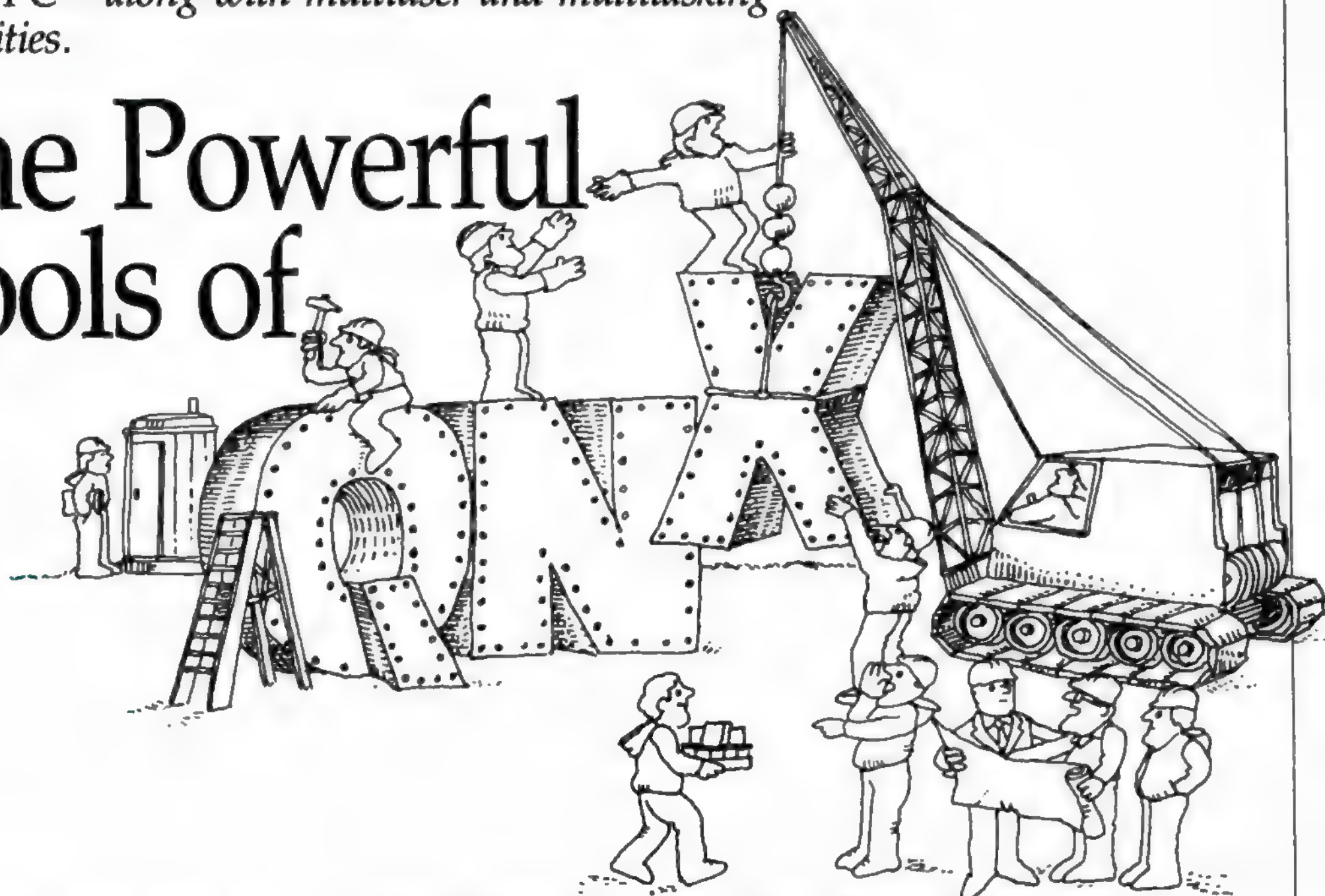
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Requires: 96K, two 320K disk drives, (RS-232 interface needed for each additional user).

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EDITOR'S NOTE: Quantum Software Systems, Inc. recently announced that it was changing the name of its operating system from Qunix to QNX. This operating system is no longer available separately. It is now part of a software package called The

Quantum System, along with the other features listed in the product identification.

The software reviewed here by James B. Morris is the QNX operating system by itself, not the complete package. Even though the QNX operating system can no longer be purchased in this form, the operating system included in The Quantum

QNX IS AN
*integrated software
environment.*

System package is essentially the same as the software reviewed here. Therefore, this review should still be useful to anyone interested in the complete Quantum System package.

"It sounds too good to be true."

I received this response recently from a friend of mine when I asked him if he had seen Quantum Software Systems' advertisements for QNX, its new operating system for the IBM PC. As professional programmers, we had enjoyed the remarkable utility of the Unix operating system for several years. Unix has been available on a large number of computer systems, but none of them qualify as personal computers. My friend and I had been lamenting the prospect of not having Unix available to use in developing software on our IBM PC systems.

I had noticed advertisements for a Unix "look-alike" system called QNX soon after I obtained my PC. Like my friend, I was skeptical about those ads when I first saw them. I wondered how a serious effort to develop a Unix look-alike system for the IBM PC could have existed without word of it leaking out. I decided to take a chance; I ordered QNX and installed it on my PC. It took only an hour of using it for



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Mainframe Software Trickles Down

Parallels can be drawn between the history of personal computing and the early history of mainframe computing. Expe-

I *HAD*
*gotten my hands on an
extraordinary piece of
software.*

rienced computer professionals have had a strong sense of *deja vu* while observing the personal computer industry. Early personal computers were (and many still are) too small and too slow to support sophisticated software. As with early users of mainframe systems, assembly language was the language of choice for serious software development on personal computers. This choice was dictated primarily by memory and processor speed limitations in early personal computers. The memory size and "horsepower" just haven't been available to allow bold advances in software sophistication on personal computers—until now.

The IBM PC is changing the rules of the game. Its 8088 processor has a reasonable amount of "horsepower" and it has a large addressable memory space. This change is sparking a revolution in the personal computer software scene.

Because this new microcomputer power has created a lucrative marketplace, professional software developers are eyeing the personal computer software markets with a lean and hungry look. When these people arrive on the scene, with powerful tools and high-level languages, the rules of the software game are going to change.

The QNX operating system is going to play an important role in this transition, not only because it has emerged so early in the transition period, but because what has emerged is of such high quality.

QNX is an integrated software environment. In addition to a modern operating

system kernel, QNX contains a flexible set of tools that can be combined in many ways to form even more powerful tools. All of the tools share common operating system interfaces and have common conventions for procedures like naming files, invoking commands, quoting strings, etc.

IBM's PC-DOS is not quite so extensive or consistent. PC-DOS provides an operating system and no more. If I want an editor, I have to buy an editor. If I want a text formatter and a compiler, I must buy them as well, probably from different manufacturers. Little system integration is possible with this approach. When I get an editor, it's likely to have functions that overlap with the text formatter. The text formatter has functions that overlap with the compiler. Each piece of software has features that will print a file on my printer, but I have to learn three different schemes to invoke this action. There is little consistency in system utilities when they come from different vendors.

Throughout this article, you will see examples of how integration of QNX tools leads to system-wide consistency. This provides system-wide simplicity and flexibility, and that is what programmer productivity is all about.

From Unix to QNX

Externally, QNX is very similar to the Unix operating system that was developed at Bell Laboratories during the early 1970s by Dennis Ritchie and Ken Thompson. They developed the system largely as a "backroom" research project at Bell Laboratories' Murray Hill facility in New Jersey. In its infancy, the system was used principally by Bell Laboratories personnel. In the mid-1970s, Unix began to be distributed to outside facilities, primarily universities. The first Unix systems ran on Digital Equipment Corporation's (DEC) PDP-11 series. Unix was immediately popular with a devoted, but small, group of followers. In some university circles and industrial sites, Unix users had the appearance of a mystic cult.

Early Unix systems were not everybody's cup of tea, however. They lacked "production-system" capabilities; there was initially no file protection mechanism. Also, Bell Laboratories did not support the system in a manner that would allow it to improve rapidly.

Another half decade passed before two

events occurred that provided the impetus behind Unix's current popularity explosion. These events were DEC's introduction of its VAX 11/780 computer and the formation of a federally supported group for Unix software enhancement. This group, at the University of California, Berkeley, under the direction of Robert Fabry, transformed Unix into a viable operating system. Berkeley's VAX Unix system now is used in many university and private industry installations throughout the world.

To witness the genesis of the QNX operating system, we must turn our attention to a unique electric train set in the computer science department at the University of Waterloo, near Toronto. It is an interesting device for teaching the principles of programming real-time systems. The electric train layout includes several track systems, track-switching devices, and trains; the track switches and trains are under the control of a microprocessor. Students are asked to write programs that control the concurrent movement of several trains throughout the track system.

In late 1979, two Waterloo students, Gordon Bell (no relation to DEC's Gordon Bell) and Dan Dodge, played with these trains in the real-time programming course, taught at that time by Gary Sager. Following this experience, Bell and Dodge were involved in the Thoth operating system project at Waterloo, which was led by Sager, Morven Gentleman, and Mike Mal-

N_{EW}
*microcomputer power
has created a lucrative
marketplace.*

colm. After their experience with Thoth, Bell and Dodge began a part-time project to develop a Thoth-like operating system kernel for the 8086 chip Intel was just beginning to produce. With the addition of a Unix-like human interface to this operating system, QNX was born. Later, the two of them, with Syd Geraghty, who would handle marketing and administrative issues, formed Quantum Software

Systems, a parent company for the development and support of QNX.

QNX Tools Are Put to Work

Have you bought a spelling checker

W_{ITH}
*powerful tools and
high-level languages, the
rules of the software
game are going to
change.*

program for your PC? If not, don't worry. A simple, but effective, spelling checker can be made by combining three primitive QNX commands, or "tools," as they are often called. When the following command is typed into Qunix, words in the file named "letr" are compared to a file of

correctly spelled words in the file named "dict," and all misspelled words are listed on the terminal!

```
words <letr | sort -u | comm -23  
dict
```

Let's look at this spelling checker in more detail, starting with the first tool, the "words" command. This command reads sentences from a file and writes the words it finds in the sentences as one word per line. It is clever enough to remove a period from the end of a word and to convert all letters to lower case. For example, if this is the text in the file called "letr,"

The quikc brown
fox jumped
over the lzy dog.

the "words" command will write the following lines:

the
quikc
brown
fox
jumped

over
the
lzy
dog

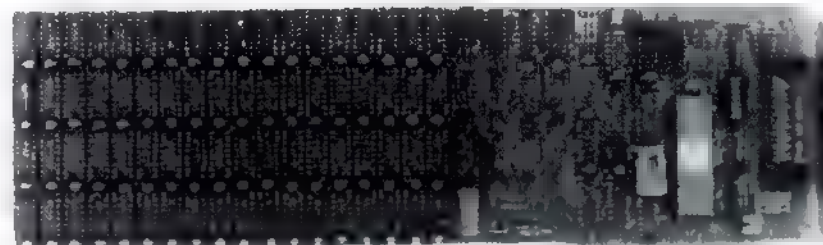
When I said that the "words" command reads sentences I meant that it reads sentences that come from what is called "standard input." The command then writes the individual, columnized words to "standard output." Normally, standard

Q_{NX}
*contains tools that can
be combined to form
even more powerful
tools.*

input comes from the keyboard and standard output goes to the terminal screen. If you type the QNX command words, the

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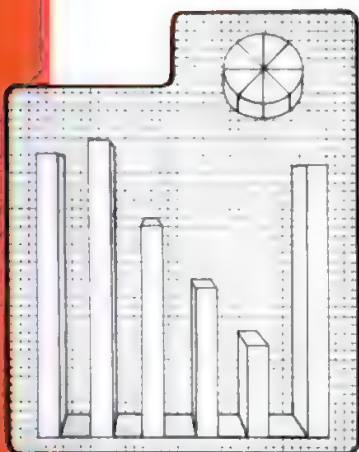
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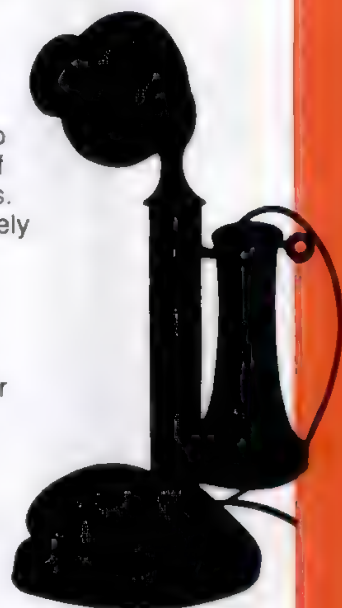
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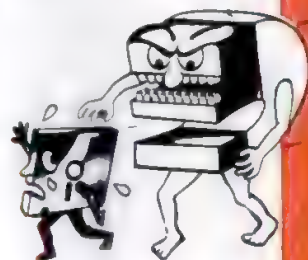
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system will read everything that is typed at the keyboard until you type an end-of-file. Then the keyboarded words will be displayed on the terminal in the single-column format.

Standard input can originate from sources other than the keyboard. If you type the command `words <letr`, for example, standard input will come from the file

THERE IS
little consistency in
system utilities when
they come from different
vendors.

called "letr" instead of from the keyboard. This procedure is called "redirection" of standard input. Standard output can also be redirected to a file instead of to the ter-

minal's screen.

A command that reads from standard input and writes to standard output is called a "filter." Filters are the basic tools of QNX. The "words" command that was used in the spelling checker is a filter.

The next item of interest in our spelling checker is the `|` symbol. Typing the command `words <letr | sort -u` tells QNX to connect the standard output of the "words <letr" command to the standard input of the "sort -u" command. What the special symbol does is called "piping" the output of the command on the left to the input of the command on the right.

The "sort" command, like the "words" command, is a filter. It is very important to note that there is nothing special about the way a filter is programmed. A filter reads from standard input and writes to standard output. The filter program doesn't know and doesn't care whether standard input comes from a redirected file or is piped from another command. Similarly, a filter doesn't know or care whether its output is redirected to a file or is piped to

another command. In all these cases, the QNX system takes responsibility for seeing that information is directed from the

THE
integration of QNX
tools leads to system-
wide consistency.

correct source to the correct destination. This responsibility never belongs to the filter, so all filters can be programmed using the same conventions.

The "sort" command should not be too much of a mystery. It sorts words it receives from standard input and sends the sorted words on to standard output. The "-u" is an option that tells the "sort" command to remove all but one of several identical lines that are grouped together after sorting. Thus, if the file "letr" con-

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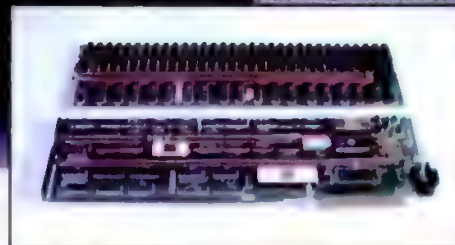
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called "spell," will contain this single-line command

```
words <#1 | sort -u | comm -23  
dict
```

The "#1" signifies that an argument is to be substituted for "#1" when the "spell" command is invoked. By typing `spell letr`, the string "letr" is substituted for all occurrences of "#1" in the file "spell." Then the lines in the file are executed, just as if they were now being typed.

UNIX USERS *had the appearance of a mystic cult.*

The "spell" command sends its output to standard output, because the last command in the spell command, "comm,"

sends its result to standard output. The output of the "spell" command can also be piped to another program by typing a command such as this:

```
spell new_letr | accum  
misspellings
```

The "accum" command reads from standard input. What it reads is both sent to standard output and appended on the file called "misspellings." With the above command, not only are the misspelled words in file "new_letr" displayed, but also I can keep a record of all the words I have ever misspelled in a file called "misspellings."

The command line above can be made into a command, as "spell" was earlier. The new command can be called by a name such as "acc_spell."

A newly created command is used just like any of the primitive commands supplied with QNX. In fact, some of the commands supplied by Quantum are actually command files that make use of more primitive commands. Other commands in

QNX are actually C programs.

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THE "WORDS"
command is clever
enough to remove a
period from the end of a
word.

"software tool" concept. You'll find it easy to build software tools with QNX because of the simplicity of its construction techniques and the thorough integration of its operating system with its command files and the C programming language.

QNX and the C Language

The C programming language is more

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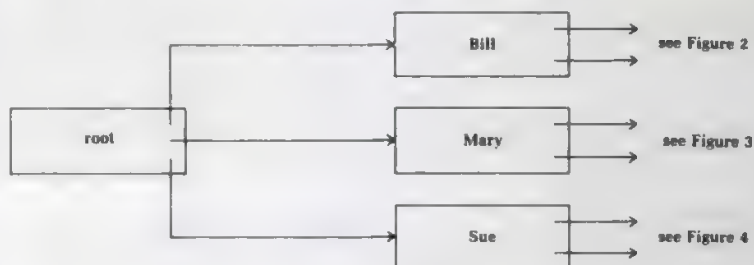
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than just one of the programming languages that can be used in the QNX system—it is an integral part of the system. This is true not only because C is a very

NORMALLY,
standard input comes
from the keyboard and
standard output goes to
the terminal screen.

good programming language for systems programming and QNX is written almost totally in C, but also because C is highly integrated with QNX. The C programmer has convenient, simple mechanisms for sending information to and receiving information from QNX. The real test of this integration is that it would not be too much more difficult to have written my

Figure 1: The structure of a root file for the filing system of QNX.



“spell” command in C rather than in the QNX command language.

The integration of C with QNX is helpful in obtaining command line information in a C program. For example, if the “comm” program I wrote earlier is to be written in C, the program must have a way to obtain the name of the dictionary file so the file can be opened and read. The mechanism for doing this in a C program is very simple.

A C program that implements a “find common lines” program (like “comm” in QNX) within the main program could be

as follows:

```

main(argc, argv)
/* "find common lines" program */
int argc;
char *argv[];
{
    int (dict_file);
    char c;
    . . .
    dict_file =
    fopen(argv[2], "r");
    . . .
    c = getc(dict_file);
  
```

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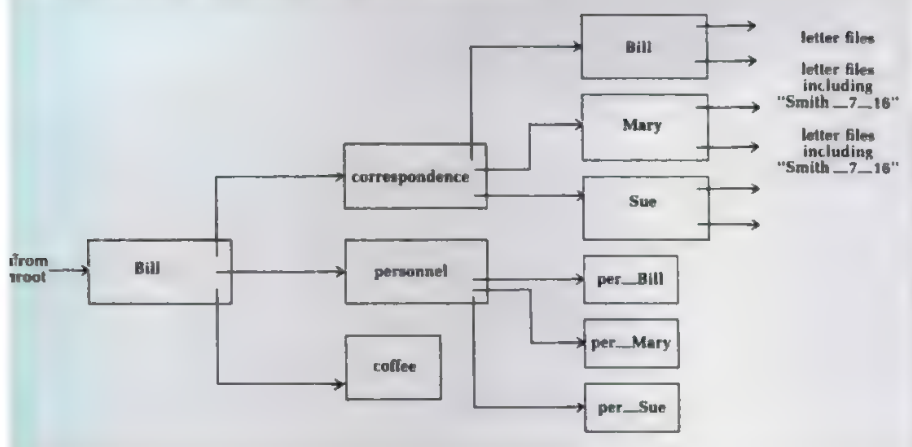
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Figure 2: Details of the home file for Bill, the secretary.



can open the file from which the "find common lines" program reads its input. The procedure call "fopen(argv[2], "r")" opens the file specified as the third string on the command line. The "fopen" procedure returns an integer that is stored in the variable named "dict_file". When subsequent file operations are performed on this input file, such as "getc" (get character) in the example, "dict_file" will be

FILTERS are the basic tools of QNX.

The "argc" and "argv" variables are initialized by QNX when it starts running the C language program. The "argc" variable is an integer that gives the number of strings to be found on the command line that invoked the program. The "argv" variable is an array that contains each of

the strings that were typed on the command line. For example, after I type the line `comm -23 dict` to activate the "find common lines" program, the integer variable "argc" will be initialized to 3, the string variable argv[0] will be initialized to "comm," argv[1] will be initialized to "-23," and argv[2] will be initialized to "dict."

After this initialization, the C program

used to designate the file on which operations are to be performed. In the example above, the file named "dict" will be opened for reading.

C programs deal with QNX's standard input and standard output just as if they

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were regular files. When a C program is executed, the predefined integer variables "stdin" and "stdout" will represent standard input and standard output. These

SOME OF
the commands supplied
by Quantum make use
of more primitive
commands.

"files" are opened by QNX before the C program itself is executed.

A C program can use file variables like "dict_file," "stdin," and "stdout" to control the flow of information in a program. For example, this C program will select a file from which it can obtain a character.

```
int f;
char which;
```

```
if (which == 's')
    f = stdin;
else
    f = dict_file;
c = getc(f);
```

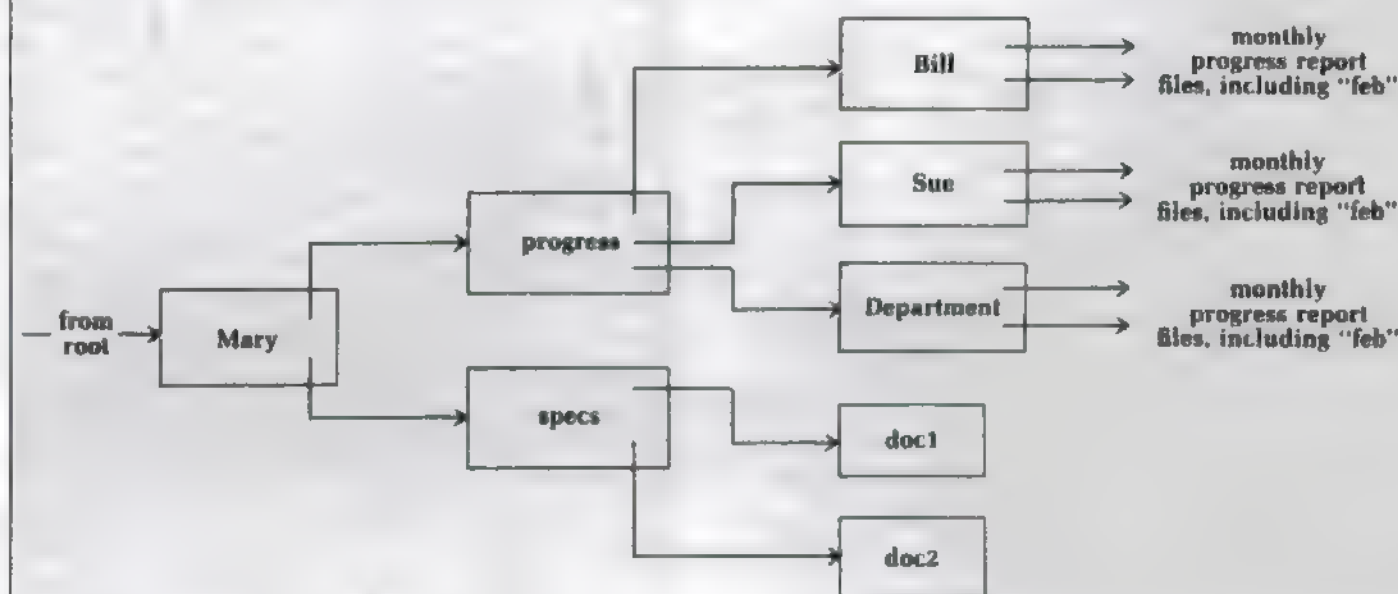
If the variable "which" contains the character "s" as its value, then a character will be obtained from standard input. Otherwise, the character will be gotten from

the file associated with the variable "dict_file."

The QNX Filing System

For several years, developers of software systems have realized that the key to controlling software complexity is the effective use of hierarchical information organization. The tree-structure of QNX's filing system provides hierarchical organization in a simple, yet useful, manner.

Figure 3: Details of the home file for Mary, the manager.



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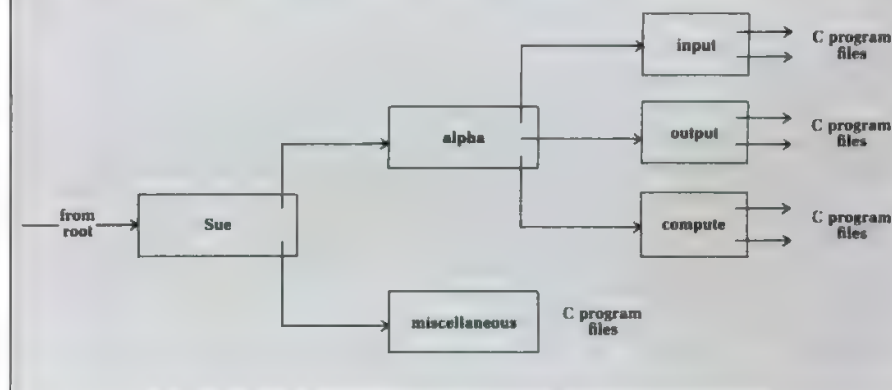
Every element in a QNX filing system is a "file" or a "directory." A QNX file is simply a string of characters. A directory is a special form of file; instead of text information, it contains pointers to other files or directories.

C IS A VERY good language for systems programming.

Files are not interpreted by the operating system. It is up to each individual program to interpret files as it sees fit. This process is simplified by a standard convention for text files that designates the ASCII Record Separator (RS) character as a line terminator.

The most important element in a filing system is its "root" directory. From the root directory, you can reach all other

Figure 4: Details of the home file for Sue, the programmer.



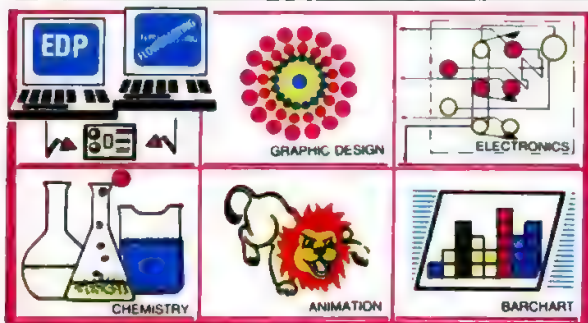
directories and files in the entire tree-structured filing system. A typical QNX filing system is structured so that the root directory first points to other directories. Each of these directories is the "home" directory for a user allowed to use the system.

A Sample Filing System

Figure 1 illustrates a filing system that will accommodate three users: Bill, Mary, and Sue. The root directory contains

pointers to three directories named "Bill," "Mary," and "Sue."

The department secretary is Bill. Bill's home directory (see Figure 2) points to two directories and contains one separate file. The two directories are named "correspondence" and "personnel." His correspondence directory points to three other directories, named "Bill," "Mary," and "Sue," that contain text files representing all the letters that the three employees have written. The personnel directory



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contains three files for the personnel records of each of the three employees. The separate file in Bill's home directory is a record of monthly payments in the coffee fund.

The department manager is Mary. Mary's home directory (see Figure 3) points to two directories named "pro-

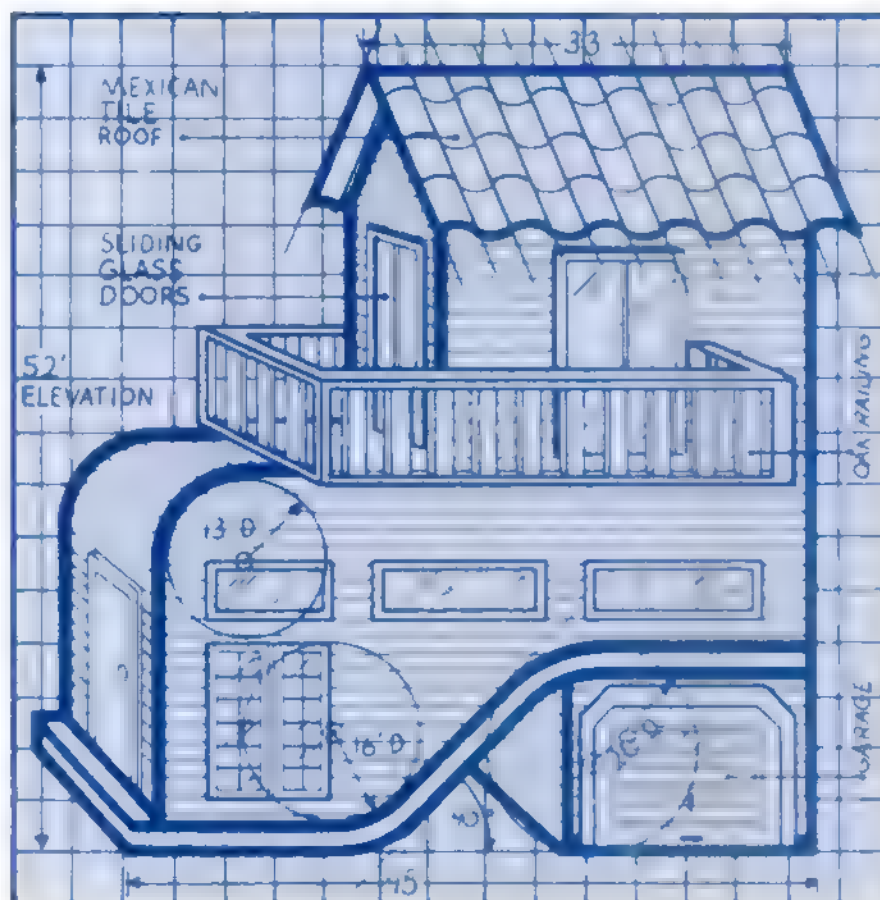
C PROGRAMS deal with QNX's standard input and standard output just as if they were regular files.

gress" and "specs." The "progress" directory points to three other directories named "Bill," "Sue," and "Department." These directories contain text files for the monthly progress reports given to Mary by Bill and Sue, as well as monthly progress reports for the department itself. The "specs" directory contains the functional specification documents written by Mary and Sue to describe the design of Project Alpha, which the department is currently responsible for developing.

The department's programmer is Sue. Sue's home directory (see Figure 4) points to two directories named "alpha" and "miscellaneous." The "alpha" directory contains all of Sue's programs for Project Alpha. This directory points to three directories named "input," "output," and "compute;" these represent the input module, the output module, and the computation module of Sue's full program for project Alpha. Sue is writing the programs in C language. Each of these directories contains text files that represent C procedures, one C procedure per file. Storing each C procedure in a separate file makes it easy for Sue to edit and maintain her C programs since she doesn't have to initialize a large file any time she uses the editor to change one line in a procedure. When she compiles the full set of C programs, the C compiler will automatically gather up all the files into one file for compiling; Sue won't have to do this herself.

Sue's other directory, named "miscel-

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PC MAGAZINE 288 APRIL 1983

aneous," is really a game-playing program, written in C, that Sue wants to market. She calls the directory "miscellaneous" to disguise its real purpose.

Now that I have a sample filing system structure to refer to, I can demonstrate how files are referenced and how to move around in a filing system. Suppose I want to list Sue's February progress report on the printer. I can't simply type `list feb`. Since there are three files named "feb" (two for Bill and Sue and one for the department), the name by itself is ambiguous. I could resolve this ambiguity by specifying the file named "Sue/feb". This seems to refer to the file "feb" in directory "Sue" of directory "progress"—but is it specific enough? What if a file named "feb" is listed in directory "Sue" under root? As before, I can provide more context to solve the ambiguity: the file can be referred to as "progress/Sue/feb". If this still might be ambiguous, the full filename, "root/Mary/progress/Sue/feb," can be given. When the full filename is used, there can be no ambiguities because it is illegal for two elements in a single directory to have the same name.

Shortcuts for Filenames

From the above discussion of filenames, you might have the impression that a good deal of typing goes on in using QNX. In practice, this is not the case at all. You'll seldom have to type a filename with even a single slash (/). This is because QNX allows several abbreviations and shortcuts in its filename conventions. First, in a fully specified filename, the "root" name never needs to be specified. The correct format for the full filename given above is "/Mary/progress/Sue/feb."

An even more useful shortcut is the "current directory" convention. When a user is logged in on a QNX system, there is always a "current directory" associated with the user. For example, because of the commands Bill has performed in the past, his current directory might be named "/Bill/correspondence/Sue." If Bill refers to a filename that does not start with a slash, the name of his current directory is prepended to the front of the specified file name. Thus, if Bill refers to file "Smith_7_16" while in the above current working directory ("/Bill/correspondence/Sue"), the file named "/Bill/correspondence/Sue/Smith_7_16" will be accessed.

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- Ability to make trades, create new teams, hold a "free agent draft"
- In addition to printing a box score, the program will update league standings and statistics; you can access the statistics, and print out "League Leaders" for the various statistical categories.

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Here is a box score of a Home Computer Major League Baseball Game.

DATE: 04-30-1983 TIME: 22:30

1982 Milwaukee Brewers (3)

NAME	AB	R	H	ER	SO	HR	RBI	SB	WALK	SH
MELTON	5	0	0	0	0	0	0	0	0	0
YOUNG	4	0	1	0	0	0	0	0	0	0
COOPER	4	0	1	0	0	0	0	0	0	0
BIRNBAUM	5	0	0	0	0	0	0	0	0	0
OSLIVIE	2	0	1	0	0	0	0	0	0	0
YOUNG	5	0	0	0	0	0	0	0	0	0
MORRIS	3	1	2	1	0	0	0	0	0	0
RODRIGUEZ	4	0	1	0	0	0	0	0	0	0
BARTNER	5	0	0	0	0	0	0	0	0	0
TEAM TOTAL	33	1	6	1	0	0	0	0	0	0

NAME	IP	HITS	RUNS	ER	WALKS	SO
CALDWELL (L)	6.3	9	1	2	2	1
OSLIVIE	0.5	3	2	2	0	0
MORRIS	1.3	2	0	0	0	0
TEAM TOTAL	8.0	14	5	4	2	1

1982 St. Louis Cardinals (5)

NAME	AB	R	H	ER	SO	HR	RBI	SB	WALK	SH
HERN	5	0	1	0	0	0	0	0	0	0
HERN	5	1	2	1	0	0	0	0	0	0
HERN	5	1	1	0	0	0	0	0	0	0
HERN	5	2	2	0	0	0	0	0	0	0
SMITH	4	1	4	1	0	0	0	0	0	0
GREEN	4	0	2	0	0	0	0	0	0	0
GREEN	4	0	1	0	0	0	0	0	0	0
PORTER	4	0	1	0	0	0	0	0	0	0
SMITH	2	0	0	0	0	0	0	0	0	0
TEAM TOTAL	37	5	14	4	0	0	0	0	0	0

NAME	IP	HITS	RUNS	ER	WALKS	SO
FORBES (W)	8.7	6	1	1	2	4
SMITH	0.3	0	0	0	0	0
TEAM TOTAL	9.0	6	1	1	2	4

1982 Brewers 1 2 3 4 5 6 7 8 9 R H T ER

1982 Cardinals 0 0 0 0 0 0 0 0 1 1 6 1

0 1 0 0 0 0 0 0 0 5 14 0

Time of game 0 hours 17 minutes 34 seconds

Technical specs: IBM P.C., 64 K minimum, at least one 320K disk drive DOS, BASIC required. Printer supported, not required.

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If a file is not in the current working directory, or is below its level, then it can be accessed by giving its full filename. In this case, there's another shortcut that can save some typing. The caret symbol ("^") can be used to indicate the directory that is up one level in the tree. Bill can refer to the file "Smith_7_16" in Mary's directory by using "^Mary/Smith_7_16" as the filename. Since his current directory is "/Bill/correspondence/Sue," this name accesses file "/Bill/correspondence/Mary/Smith_7_16." Another alternative is to move to a new current directory. To change his current directory to "/Bill/correspondence/Mary," Bill can type `cd ^Mary`. After executing this change, Bill can now refer to the file that was accessed in the last paragraph as (^Mary/Smith_7_16") as simply "Smith_7_16." The full name of the accessed file is actually "/Bill/correspondence/Mary/Smith_7_16."

File Protection

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THE TREE-structure of QNX's filing system provides hierarchical organization in a simple, yet useful, manner.

have not traditionally supported protected filing systems. In the example above, the personnel directory certainly contains sensitive information that should not be accessible to everybody. Similarly, Sue probably doesn't want to have Mary snooping around in her "miscellaneous" directory! QNX supports a two-level file protection scheme, so file permissions can be specified for the owner of the file and for each of the other users. QNX supports four file protection permissions: read only, write only, append only, and execute only. By combining these permissions, a file can be classified for any user as read and execute only, read and append only, etc.

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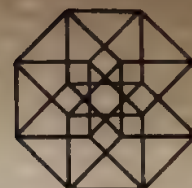
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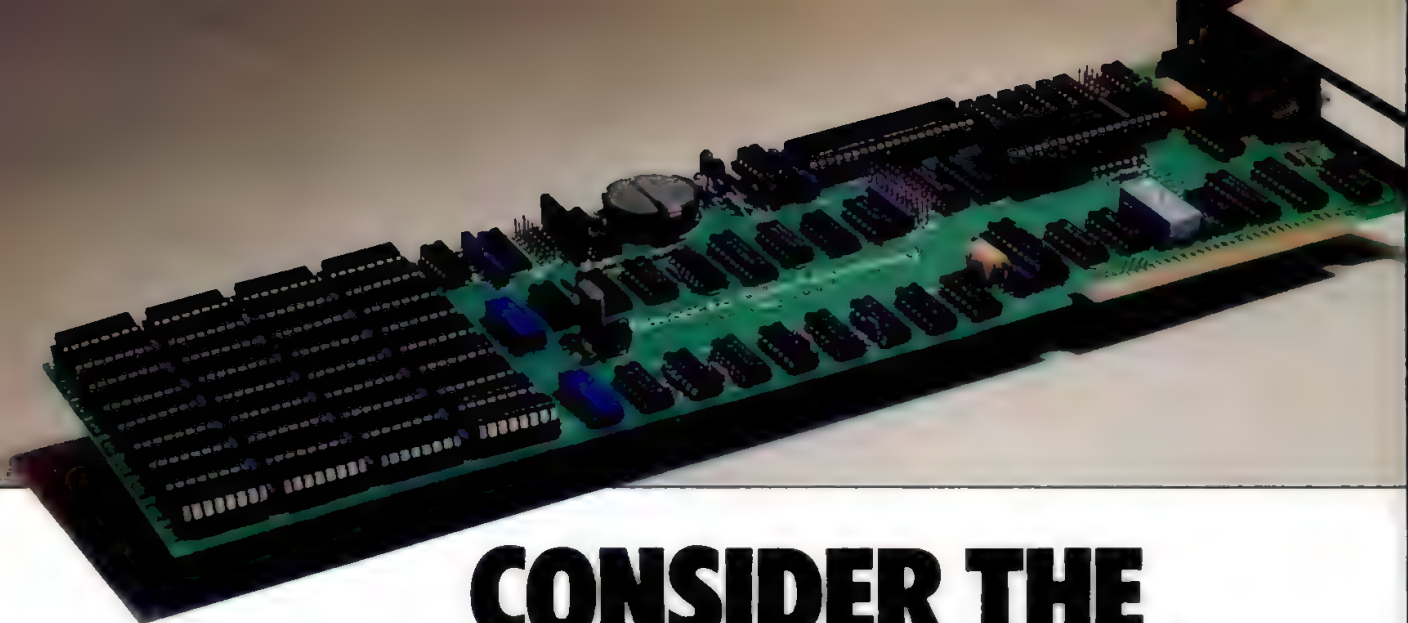
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A Multitasking System

QNX is a multitasking operating system, able to maintain several programs, or "tasks," in various stages of completion, that can be selected for execution in any order. QNX can switch the processor among different tasks; each is performed in a short time period called a "time-slice," so no task is delayed for a long period of time.

EVERY
element in a QNX filing
system is a "file" or a
"directory."

od of time.

A single-tasking operating system can maintain only one active program at one time. Have you ever asked your PC to print a long file and then wanted to do some editing while the printer was cranking away? On a single-tasking operating system, your quota of one task is used up by the printer. You can't edit until the printing is finished because your operating system will only support one active task at a time. All you can do is go get some coffee and twiddle your thumbs.

A multitasking operating system can print a file, ship another file to another computer over a communications link, compile a program, and allow a file to be edited, all at the same time. Not only that, but when an operating system already supports multitasking, it is fairly easy to make it support multiple users. QNX does this.

Here's an example of how QNX can maintain several active tasks at once. First, I start the task of printing a file by typing `list game.c &`. The "&" tells QNX that listing the program "game.c" on the printer is one of a series of tasks. After I type this command, the operating system's prompt comes back right away. QNX is waiting for another command! Meanwhile, the printer starts listing the file.

If the command was typed without the "&" as `list game.c`, the file would still be printed, but a prompt wouldn't come back from QNX until the print task was finished.

Now that the printer has started listing the file and a prompt has come back from

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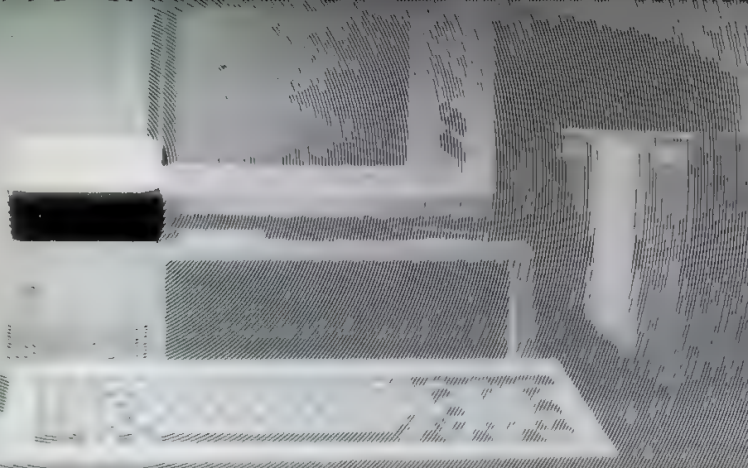
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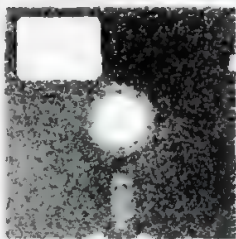
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CIRCLE 405 ON READER SERVICE CARD

QNX, I can issue another command. This time the command is `cc game.c &`. This starts the C compiler compiling the "game.c" program. Again, a prompt comes back from QNX immediately. While the second task is active, QNX is ready for another command to be issued. Even though the C compiler has started to compile the program, I am still free to edit another program if I wish.

Pipes

You can't fully appreciate the real beauty of QNX until you understand how "pipes" are implemented in QNX. The relationship of pipes to multitasking is the strongest example of the consistency and simplicity of QNX.

Recall the spelling checker command, named "spell," that I had created.

```
words <letr | sort -u | comm -23
dict
```

When this command is issued to QNX, three tasks are started simultaneously: "words," "sort," and "comm." Two pipes are also initialized, one between "words" and "sort" (the w-s pipe) and one between "sort" and "comm" (the s-c pipe). To simplify things here, think of a pipe as consisting of a block of N memory words and an integer variable C that is a count of the number of bytes currently stored in the memory block. If C = 0, then the pipe is "empty." If C = N, then the pipe is "full."

Immediately after the spelling checker command line is issued, the three tasks begin execution and the following happens:

- (1) The task "words" starts to read from file "letr" and write to pipe w-s.
- (2) The task "sort" tries to read from pipe w-s, but finds it empty.
- (3) The task "comm" tries to read from pipe s-c, but finds it empty.

At this point, QNX puts the tasks "sort" and "comm" to sleep, so only the task "words" is running. It continues to read from file "letr" and put information into pipe w-s. Two events can occur to change the state of affairs:

- (1) Pipe w-s fills up.
- (2) The task "words" uses up its time slice.

When either event occurs, the QNX system comes back into the picture and notes that some action is required. Let's assume the second event has occurred; it



is more interesting and it occurs more often than the first event. Since the w-s pipe is no longer empty, the "sort" task has something to do, so QNX wakes it up. Task "words" still has something to do, because the w-s pipe is not yet full. So the

QNX WILL
share the processor
among all active tasks,
each for a short time
slice.

tasks "words" and "sort" are both awake and ready to run at this point. QNX now must decide which task to run. This process is called "scheduling" a task for execution. After one of the tasks is scheduled, execution of the task begins and QNX leaves the picture. This alternation continues until all three tasks are completed.

It is very likely that sometime during the execution of the "spell" command all three tasks will be awake. This situation occurs when both pipes are nonempty and nonfull. When this happens, QNX will share the processor among all three active tasks, each for a short time slice.

On personal computers, especially those with very slow peripheral devices, it is important for an operating system to be like a juggler who keeps a lot of balls in the air. It is particularly important to be able to have the processor running and doing useful work at the same time that reading to and writing from a disk is occurring. Otherwise, work is delayed while the processor must wait for the floppy disk to finish, which must then wait for the processor to finish, which must then wait for the floppy disk, etc.

The IBM PC is a substantial computing system, but its full potential can only be realized when multitasking can be used. QNX gives you the power to maximize utilization of the PC's resources. /PC

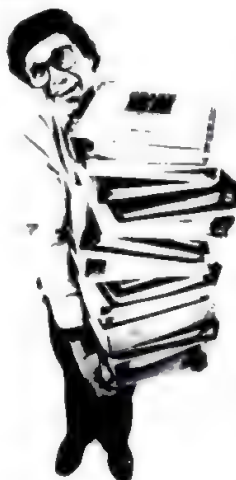
James B. Morris is a consultant in the computer field and an adjunct associate professor of computer science at the Oregon Graduate Center.

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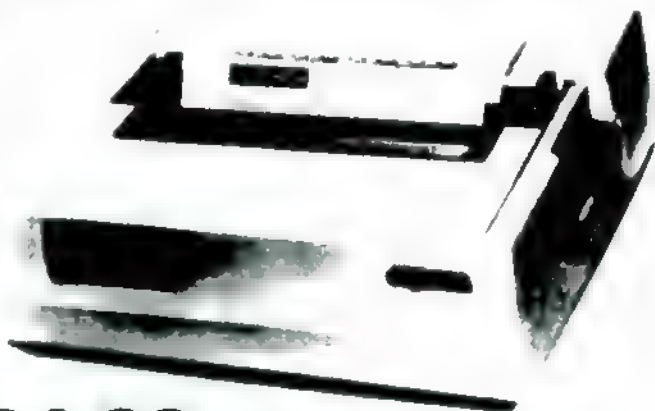
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CIRCLE 425 ON READER SERVICE CARD

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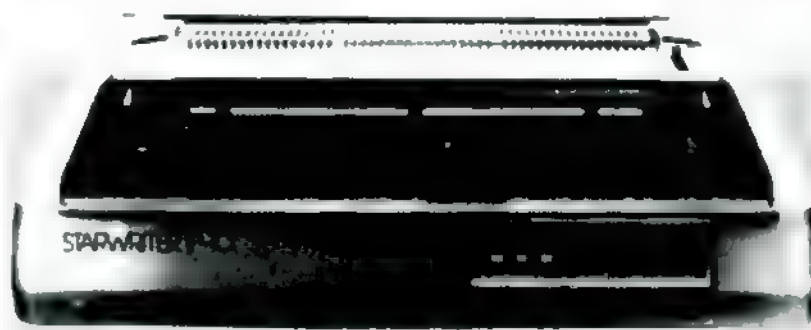


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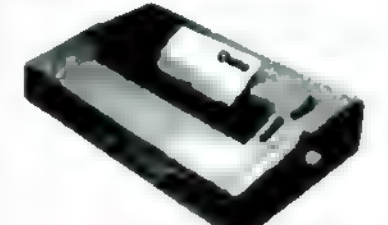
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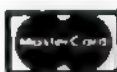
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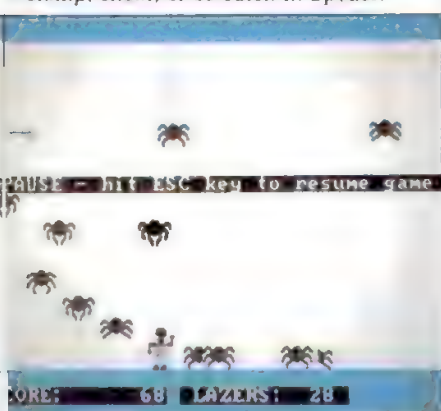
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Requires: 64K, color/graphics adapter color or monochrome monitor or television, DOS 1.1.

CIRCLE 610 ON READER SERVICE CARD

This is a creepy game, but oh so very well designed. Spyder casts you as a little person on the floor of a cave. From above, slowly at first but soon at a frenzied pace, clutching spiders descend from the top of the screen. If you can position yourself squarely underneath one of the spiders, you have a few chances to fire your "lazer" into his beady little eyes. But don't take too long, for these spiders spin deadly webs. If the spider makes it all the way to the floor of the cave, it will begin scurrying toward you. Your lazer gun won't shoot sideways, but you are equipped with a secret weapon, huge cartoon-like shoes that you can direct left or right to squash an offending arachnid.

stomp, shoot, or be eaten in Spyder.



If all of this sounds frantic, you're right, but you haven't seen anything yet. In the upper levels of this game a pair of scissors occasionally scoots across the screen, cutting the strings above whatever spiders it passes. They then drop to the floor quickly and head right for you.

The quality of the graphics falls some-

pack for a recharge.

There are many nice touches to this game. Your score increases for each spider you shoot or squash, of course, but you lose points when you fire and miss. The game can be stopped in midplay and resumed, the sound can be toggled on or off at the start of play, and the game maintains a record for high scores. To give you something to shoot at, it includes an outrageously high score racked up by Edward Weed, identified in the credits as the game's designer.

The game was tested on two different RGB monitors with very impressive results. The display was also checked on a monochrome monitor attached to the color/graphics adapter and found to be quite playable if somewhat less attractive. One problem, not the fault of Mirror Images Software: Spyder would not run under DOS 2.0, apparently because of a change in memory address in that new operating system. I'm sure this is not the only instance of such incompatibility, and I imagine it can be corrected by software designers. I'd award this game five creeps and a crawl out of five. —Corey Sandler

THE SCREEN suddenly fills up with hundreds of gloating spiders.

where between excellent and superb. The spiders are two-colored, with gleaming eyes. The little man is three-colored, with moving arms, legs, head and oversized L.L. Bean mukaluks. The little scissors snip as they cross the screen. The spiders dance a ballet of conquest when they've trapped you, and then proceed to spin a bright red web around your body. One minor flaw: the spiders have six legs, which is fine for insects, but hardly sufficient for octopeds in good standing.

The tour-de-force of the game comes after you have been captured. After the dance and the web-spinning, the screen suddenly fills up with hundreds of gloating spiders. Creepy!

The sound effects have not been overlooked, either. The intensity, pitch, and tempo of Spyder increases with each threat to your personal safety. You hear a warning beep when you run out of lazars, and a congratulatory whistle when you move your little man over to the energy

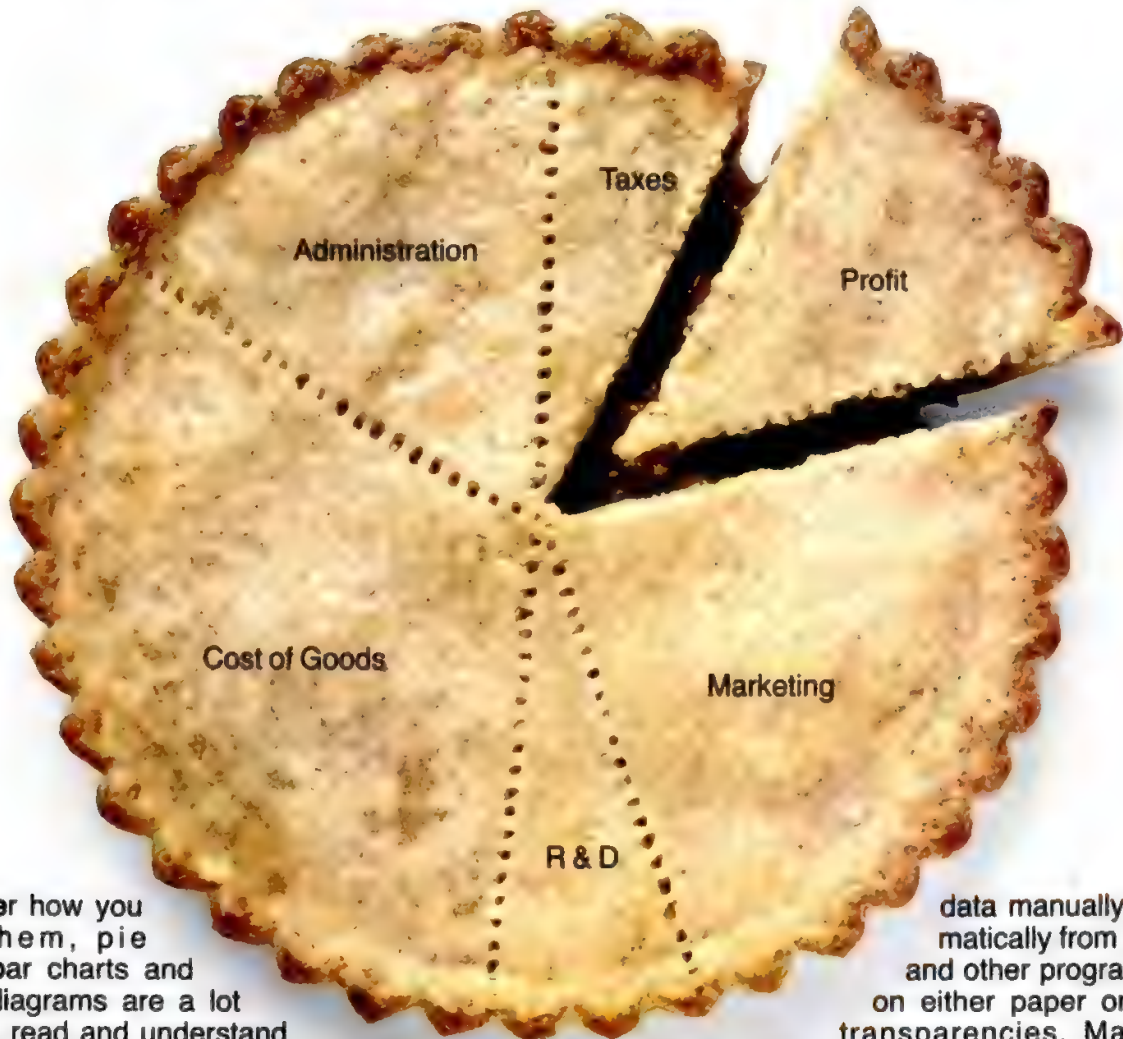
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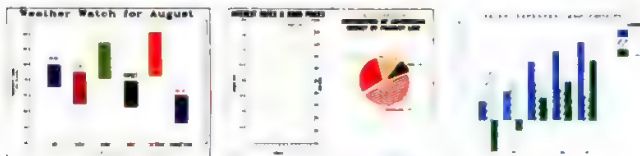
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CIRCLE 221 ON READER SERVICE CARD

game. Sooner or later those aliens are really going to get angry.

Terran Jeopardy is the latest in this tired craze. It includes only a few minor variations worth mentioning. What is worth pointing out, though, is the fact that an unwary buyer might never know that inside the attractive folder for this product is yet another version of *Space Invaders*. Another point is the claim by the developers that this is a "fast and furious arcade action game." Those words might serve to make you furious, fast. The game is much slower than many other PC games recently tested, and the play action is severely hampered by the fact that the program appears to handle only one action at a time.

In fact, the game is so sluggish when you fire at the aliens that you can rack up very high scores by keeping your finger on the firing button at all times.

The game does not use joysticks. The left and right arrow keys move the defending ship, the space bar stops its motion, and the F key is the firing button.

There are a few pluses. The sound effects are very much like an arcade version (they can be shut off, too). The aliens are pretty, and the yellow and red explosions of your defending base are convincing. There is, however, no way to store your high score on disk and no way to suspend the game in mid-shoot-em-up.

—Corey Sandler

FLIPPERBALL

Distributed Software Systems, Inc.
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List Price: \$29.95

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CIRCLE 648 ON READER SERVICE CARD

You might want to mount your PC on shock absorbers before you make *Flipperball* a part of your collection. This pro-

Flipperball screen at rest



gram is an impressive simulation of a pin-ball machine, the electronic "ball" bounces off bumpers, momentarily hangs onto magnetic traps, and ricochets off walls on the screen. It's not the competent graphics or the cute sounds that make this game interesting, though, it's the first-class replication of the laws of physics.

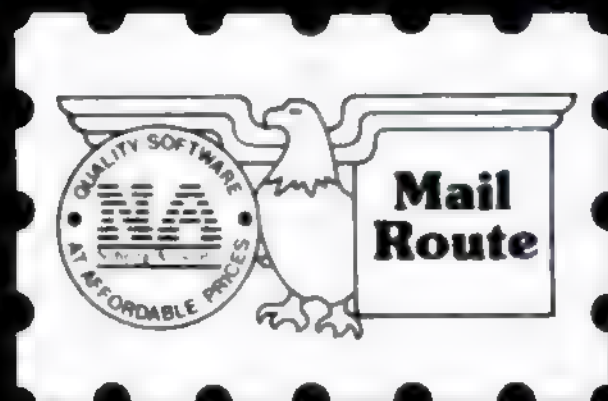
The screen display for *Flipperball* shows a green square with red extra-point outlines on some bumpers. The yellow ball, which is actually squared off, rests in

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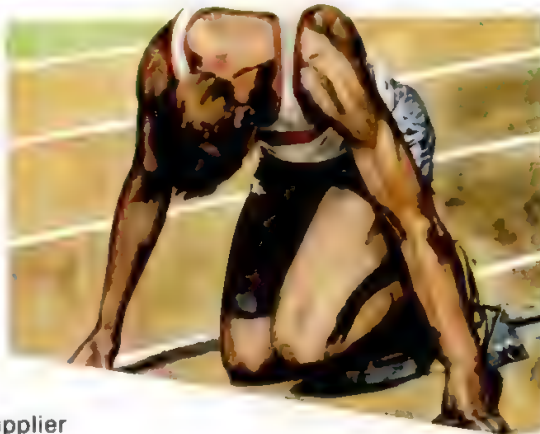
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a side channel above an approximation of the mechanical plunger that starts a real pinball on its way. You pull the plunger down using the down arrow on the cursor pad, and release it by typing the Return key. Just as in a real mechanical game, the

THE ELECTRONIC "ball" bounces off bumpers, momentarily hangs onto magnetic traps, and ricochets off walls on the screen.

farther down you pull the plunger the more vigorous the release and the harder the ball will fly into the raceway at the top of the screen. Pulling the plunger too

"lightly" will send the ball only partly up the chute.

Flipper controls are the back slash (\) and forward slash (/) on the PC keyboard—appropriate and convenient choices. The first display allows you to change game options. The F1 function key turns the sound on or off. F2 allows choice of type of monitor: high resolution, medium resolution, or television screen. The game was tested on two different color monitors and a monochrome screen driven by the color/graphics board. On the monochrome screen, the high-persistence phosphors left a ghostly trail behind the ball for a few fractions of a second, which was not displeasing but was occasionally distracting.

Two other controls, F3 and F4, allow you to move the image left or right on a television screen if necessary. Finally, F9 displays the disk record of high scores. You can pause the game by pressing the F10 during play; pressing the Escape key bombs the program out and returns the user to the DOS prompt.

The only thing really missing from *Flipperball* is a way to apply a little body English. No matter how much I leaned into the keyboard, the ball still insisted on obeying the law of gravity. But then, the *Pinball Wizard* didn't need any lights a'flashing and never tilted at all.

BRIDGE BIDDER

PS Software

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Requires: 64K, one disk drive, printer optional.

CIRCLE 608 ON READER SERVICE CARD

Bridge is a game played by four people using a standard deck of 52 cards. At the start of a hand each player is dealt 13 cards. The object of the game is for a partnership to contract for a number of tricks during the bidding and for that partner-

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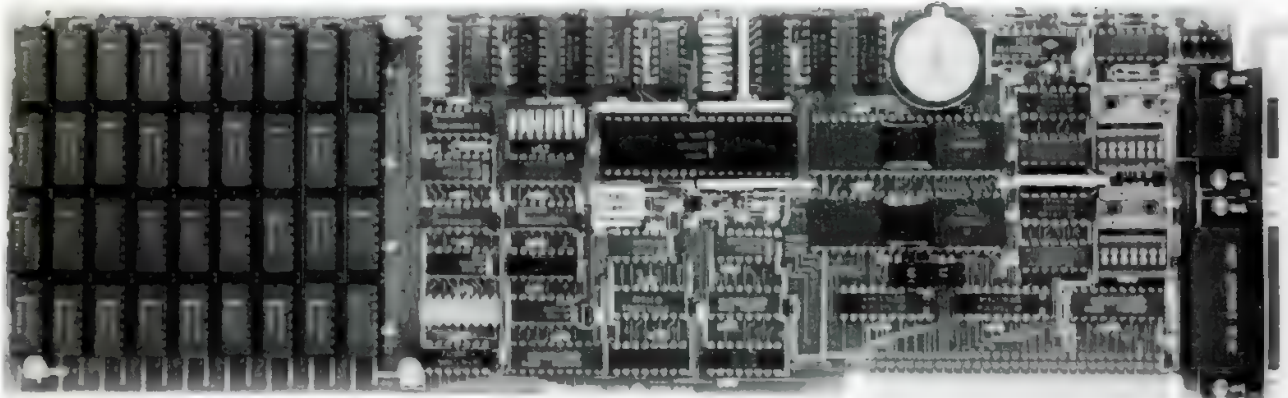
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Comprehensive documentation is provided with numerous illustrations to simplify installation procedures. All documentation fits neatly into existing 3-ring binders provided with the Personal Computer.

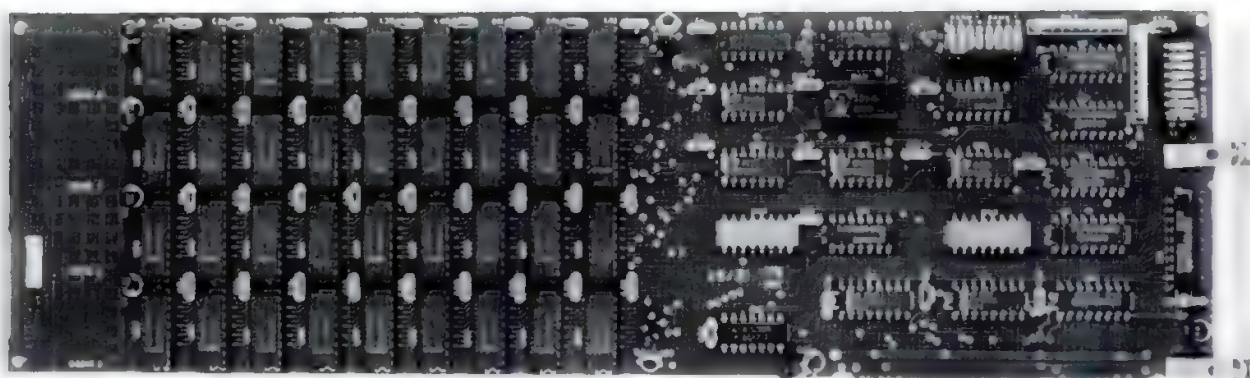
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CIRCLE 105 ON READER SERVICE CARD

ship to win at least that number of tricks during the play.

The *Bridge Bidder* does not teach users how to play bridge. It is a simulation program that teaches beginners how to bid and helps to sharpen the skills of experienced players.

The manual that accompanies the disk explains the language and basics of bidding to beginners in five lessons. After going through the bidding, the computer displays the cards in all four hands, allowing the user to see if the final contract was appropriate. If the player wants to try a different bid, the computer repeats the hand.

Duplicate Hands

The manual takes the player from how many cards each person is dealt to how to bid in most situations. Three quizzes follow the opening three lessons.

Lesson One teaches the player how to evaluate a hand by counting the high card points and the distribution points. The directions are clear and learning takes about an hour.

Lesson Two tests a player's understanding of opening bids. Lesson Three covers the player's understanding of the responder's bids, the response a player makes to a partner's opening bid.

Players have an almost unlimited number of hands available for practice. By keeping track of the number used to generate the hand, you can call up the same cards over and over to see how a different choice of bids affects the final contract. The ability to duplicate the hand means

I NSTRUCTIONS

are given for loading the necessary DOS and BASIC but not for copying them onto the program.

that partners can play the same cards and increase their understanding of one another's behavior, often a sore point in a real game.

Bidding is based on the commonly used Standard American system. The use of "weak two bids" is optional.

Shuffle And Deal

In general, the screen prompts are good and the keystrokes for entering a response are minimal. The *Bridge Bidder* gives plenty of examples so the basics get embedded in the mind painlessly.

T HE PROGRAM

usually bids correctly, but there is no excuse for its occasional illegal bid.

One of the things a player will quickly tire of is the length of time the program takes to shuffle and deal. It's not as bad as in a real game, but 30 seconds of waiting after 30 seconds of play means that at times the player and the computer are on a par when it comes to the clock. There are ways around the delay, but instead of programming out the difficulty, PS Software has elected to let the player take the penalty.

There is a "hint" key, but all the hint does in the section on opening bids is tell what the computer would do. It does not tell why the particular action is suggested, so its value is limited. The "hint" is helpful in subsequent sections when the player can at least try the play the way the computer recommends it and see the evolution at the end when the other cards are visible.

Documentation

Bridge Bidder is not copy-protected. The 22-page manual is computer-printed. Instructions are given for loading the necessary DOS and BASIC but not for copying them onto the program itself for easier access in a shorter time.

A monochrome screen is all that is needed since the program does not use color. A printer is optional, depending on whether or not the player wants to make hard copies of the completed hands for

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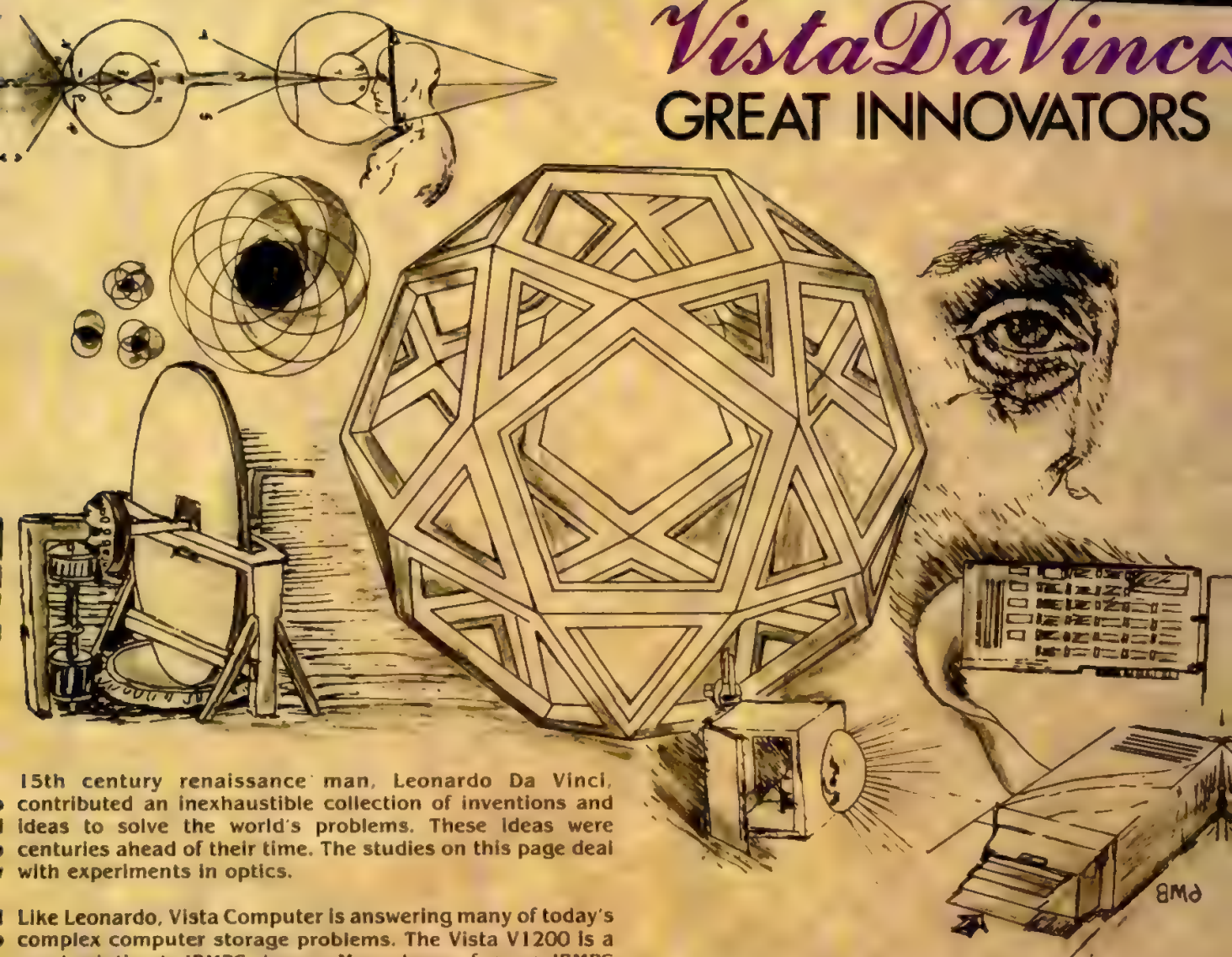
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CIRCLE 263 ON READER SERVICE CARD

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CIRCLE 423 ON READER SERVICE CARD

later study.

The first two lessons are for rank beginners who have only heard the word "bridge". The other lessons are for more experienced players who will find the entire program easy to deal with but not as accurate as one might want.

The manual is reader-friendly, the program is user-friendly, but a bridge-playing human friend will be needed at some

THE BRIDGE *Bidder is up against stiff competition from the nonelectronic field of bridge-learning aids.*

point or another. Take heart. There are lots of bridge players around and most of them are eager to welcome a novice to the ranks.

Player Problems

The program usually bids correctly, but there is no excuse for its occasional illegal bid. In one hand, for example, one spade was bid in response to two clubs. This is illegal since, as at an auction, the bids have to go higher each time.

In another example, West illegally doubled partner East's double. Even worse, East doubled again. Such mistakes make it hard for a newcomer who has to rely on the teacher's word.

The Bridge Bidder is up against stiff competition from the nonelectronic field of bridge-learning aids that do not make mistakes as often and are much cheaper.

Basically, the Bridge Bidder is on the right track, but the train has not yet arrived at its destination.

The main problem is that the program badly misleads players about 10 percent of the time.

The program makes a valiant attempt to teach the beginner how to bid, but the rules and conventions of bridge, which must be followed carefully, make this difficult. There's no room—not even 10 percent—for confusion.

Bridge bidding is not something most people learn in a day. The Bridge Bidder

does start beginners on the way, but more advanced players may have reservations about the program's value for them.

THE STUD POKER PARLOR

QSI Software

P.O.B. 3-231 ECB

Anchorage, AK 99501

(907) 265-8187

List Price: \$29.95

Requires: 64K, one disk drive

CIRCLE 607 ON READER SERVICE CARD

The Stud Poker Parlor simulates real playing action between the computer and the player in five- or seven-card action.

The screen displays the hands held by both players. The hands are easy to read since each suit occupies a separate column. This means that cards in the same suit stand out clearly. There is no problem telling a heart from a diamond.

The screen options allow the player to easily pick the computer's skill level (novice, average, or advanced) and playing style (aggressive, conservative, or in between). The player chooses whether a beep will be used to mark invalid entries, which character line width (40 or 80) to use, and if the play will be in color or monochrome.

The next choices are for five- or seven-card stud, the bankroll (up to \$99,999,999 on an 80-column screen), the pot limit (if one is wanted), the ante, the maximum bet, and the maximum number of raises.

Shuffle, Deal, and Bet

Hitting F-6 at any time provides a review of the ranking of poker hands from highest to lowest and their characteristics. This is a helpful aid for beginners.

The playing screen is divided into four areas. The first several lines are used for messages that indicate if a new hand or game is to be started, if a showdown is coming, if an error was made, and who won if neither player folded.

The second area of the screen shows both hands. The computer's hole cards (cards dealt facedown) are not displayed unless a showdown takes place.

The third area, below the hands, shows the ongoing betting, raising and folding. The fourth area of the screen shows the current contents of the pot, each player's

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CIRCLE 238 ON READER SERVICE CARD

current bankroll, and the number of the hand being played. This area also shows the maximum bet and raises and the pot limit if one has been set.

The status area at the bottom of the screen tells what the computer is currently doing, such as shuffling, dealing, looking (to see who plays first), deciding on a bet, or waiting for a play.

The play is very simple and fast. Commands are single keystrokes and the function keys are used to good advantage. The enter key, which the manual describes as the one "with the bent arrow above the PrtSc key," enters the player's choices. Instructions as clear as this should give users a feeling of confidence.

The Stud Poker Parlor is not copy-protected. The manual gives clear and complete instructions for adding DOS, BASIC and the Stud Poker Parlor game on either a single- or two-drive system. The job takes about 5 minutes and the original game disk becomes the backup copy.

QSI Software plans to change its 11-page, computer-printed advance manual to the smaller format of the IBM manual. Hints on playing strategy are not included in the current manual.

Calling A Bluff

The Stud Poker Parlor promises a challenge for both the beginner and the advanced player. It delivers on that promise.

Bluffing is still part of the game, but remember the computer learns a player's

THE STUD
*Poker Parlor promises a
challenge. It delivers on
that promise.*

style and adjusts for it. After all, no computer wants to lose all the time.

I acted the part of a timid player by folding early for several hands. On the next hand, despite a winning pair showing, the computer tried to bluff outrageously. After that hand, the computer learned it was not possible to bluff all the time and adjusted its playing style accord-

ingly.

As in a real game, a fold means the opponent does not have to show the cards. One flaw is the computer does show its losing hand when it is the caller. No real poker player would do that.

Colors And Strategy

Problems are few in the Stud Poker Parlor and not that important in a game that delivers on intelligent playing action, adjusts for the user's style and is fast. It

READABILITY
*in the color option
depends on the type of
monitor used.*

should be mentioned, however, that readability in the color option depends on the type of monitor used. On some, the screen is illegible. The manual says an RGB display monitor gives the best color results.

The color does not add measurably to the game, but it is available if you like the extra blue, green, and pink and are willing to make a trade-off in readability for it. The 40-column monochrome display is very crisp.

At times it would have been nice to be able to deal the same hand over and see what a change in playing strategy did, but that would not be real poker and this game is best at simulating the real playing situation.

Stud Poker Parlor is a nice package. It anticipates user questions and answers them simply and clearly. There is excellent screen readability on the 40-column width and the action is fast-paced. The program takes only a few seconds to shuffle and deal; waiting is very minimal.

A player does have to be familiar with basic terms such as "fold," but most of these are covered in the manual. The program never takes the money and runs. It keeps track of the betting and does not cheat.

There's no razzle-dazzle here or fancy sounds and graphics as in some of the other card simulation games on the market. There's just good, solid stud-poker playing at a modest price. /PC

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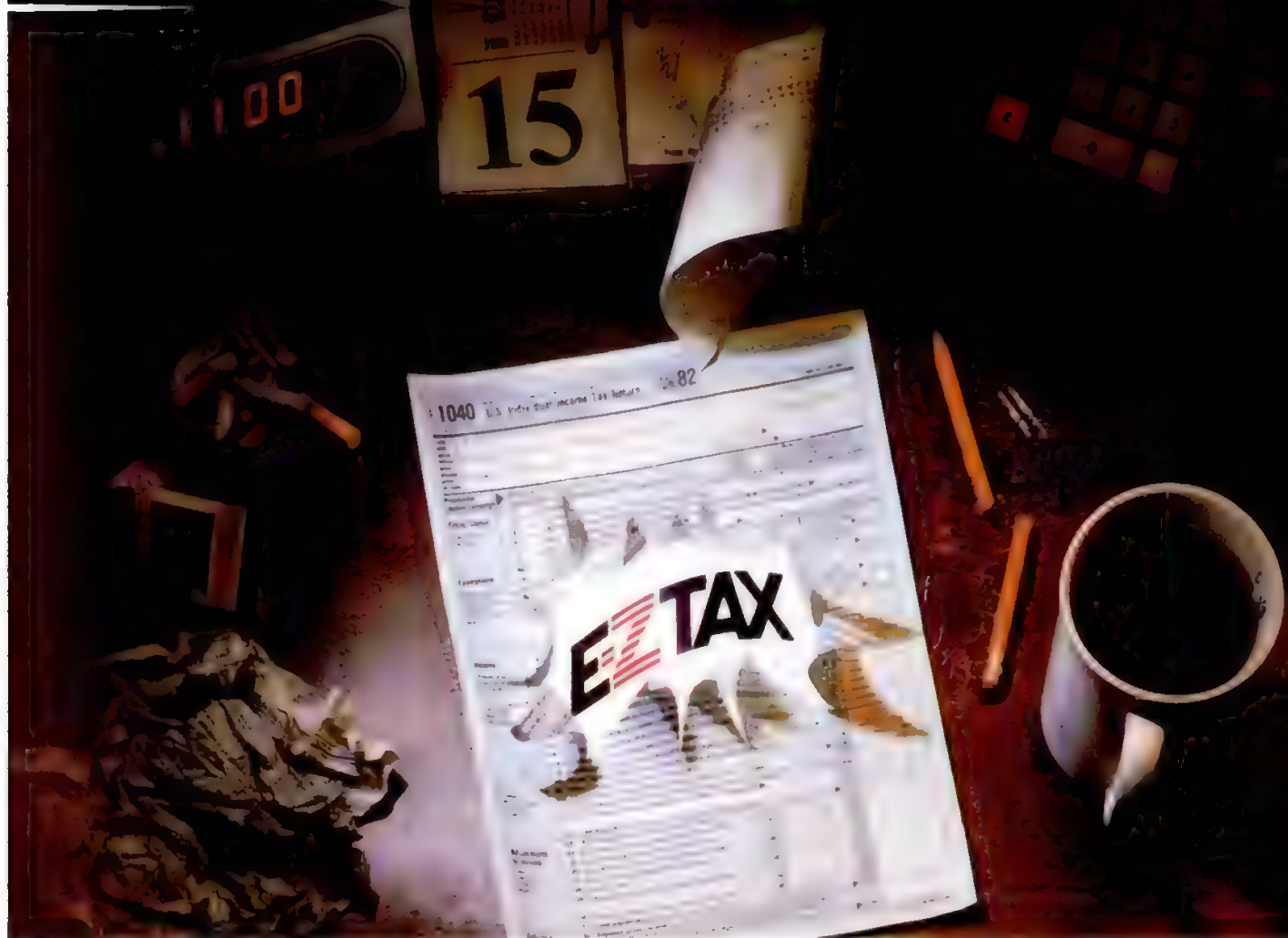
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Just because you have a PC, don't throw out your appointments calendar just yet; you may regret it.

LOOK BEFORE YOU WEEP: FIVE TIME MANAGEMENT PROGRAMS TO AVOID

Try this simple test: insert one ripe banana, one-half cup of plain yogurt, and one tablespoon of honey into drive A of your PC. Type Diskcopy. Do not be alarmed if you get an error message: simply type R until the drink is smooth and creamy. Gently tip the system unit and pour the contents of drive A into a well-chilled glass. Enjoy.

Does your drink taste a little funny? Do you keep receiving Disk Read Errors from Drive A? You have just learned a valuable lesson: a computer is not a blender.

Computers are multi-purpose machines, but they're not all-purpose. You can use one to pound nails, but you'd be a lot better off with a hammer. A computer is not a toaster, and it's not a snow shovel. And after working with five "time management" programs, I've discovered that it's not the world's greatest datebook either.

Suppose you have a client on the line. This illustrious gentleman is willing to let you present your state-of-the-art cheese inventory software. Are you free a week from Tuesday at ten?

"I'll check the computer," you tell him proudly, reminding him that you know your way around in the world of the byte. You save the file you're working on, take the disks out of the drives, and search for

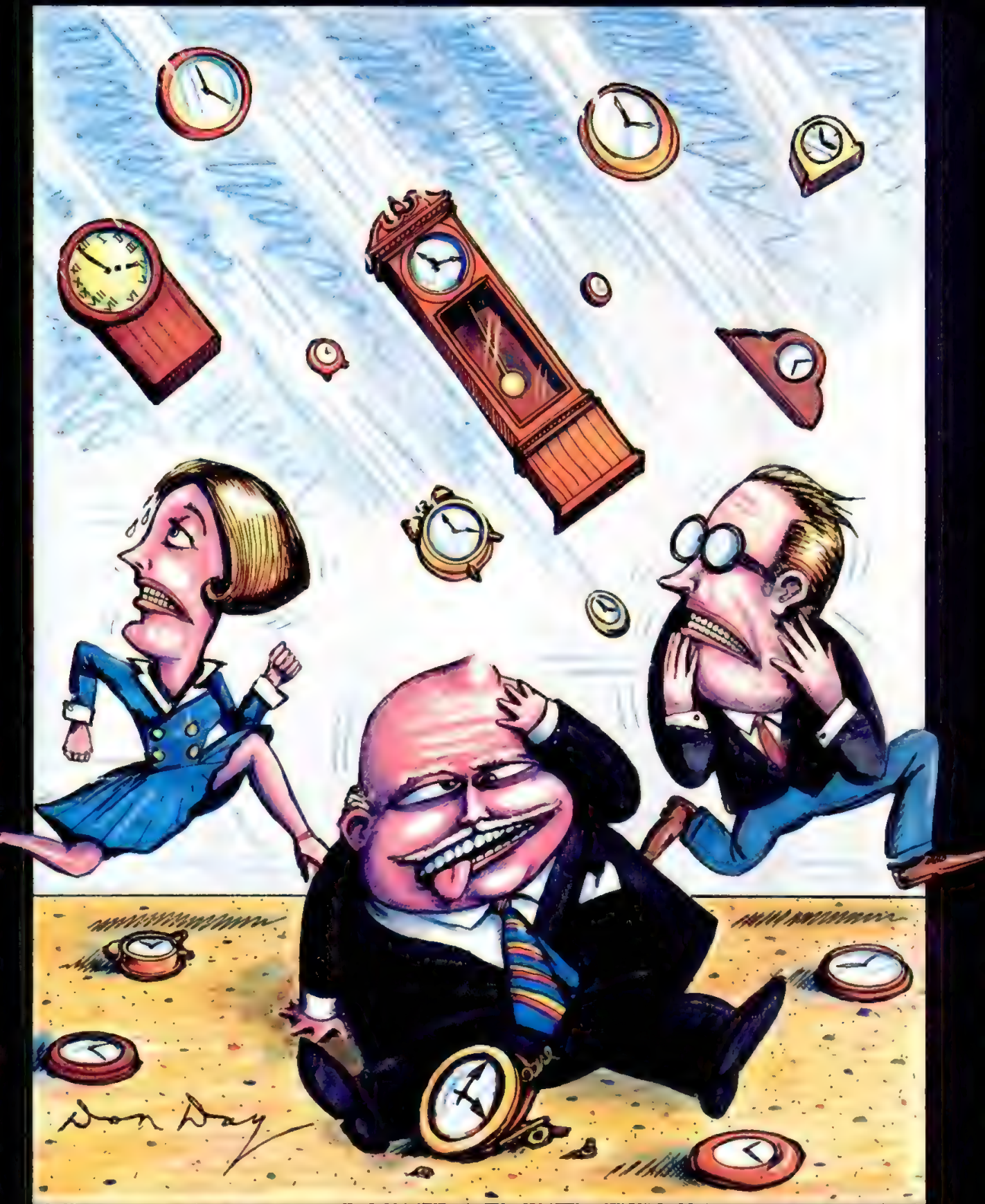
the jackets, which seem to have disappeared. Well, you'll just swap them with the ones for Time Saver.

But where did you put the Time Saver disk? Aha! There! While you're booting it, you look frantically for the data disk that goes with it. You seem to have misfiled it under the Limburger account.

Now all you have to do is enter TS, wait for the program to load, and type in today's date and time—which you have to check your watch to find out. For some reason, the program isn't able to pick it up from DOS.

A calendar comes up on the screen. You discover that a week from Tuesday occurs next month. You type F for forward, get next month's calendar, move the cursor to the first Tuesday, press the Enter key, and presto!—there's your appointment schedule. Unfortunately, you are spending Tuesday at an industry seminar. With a mere dozen keystrokes, you use the search function to find out when you're free. Since it insists that you have lunch from noon to one every day, the first available 2-hour slot it finds is 3 weeks from Wednesday. Maybe you'd better ask your client when he's available.

Too late. The line is dead. Your client is a busy man. You wonder how you're going to explain to him about all the time he will save by putting his inventory on



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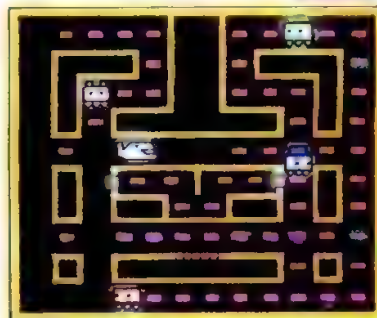
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the computer. You begin to think Time Saver should be called "Day-At-A-Glance-After-Forty-Keystrokes-And-Ten-Screen-Rewrites."

That's why the term "time management" is one of the most infelicitous phrases since "word processing." These programs are simply glorified appointment calendars. Are they worth the money and the trouble? Well, don't chuck your datebook into the wastebasket just yet.

Time Manager
Microsoft, Inc.
(distributed by IBM)
P.O. Box 1328-C
Boca Raton, FL 33432

List Price: \$100

Requires: 64K, PC-DOS, one disk drive.

CIRCLE 606 ON READER SERVICE CARD

IBM's Time Manager (produced by Microsoft, Inc.) is without question the class act of this bunch. It allows you to set up a disk containing an appointment calendar for an entire year and enter just about anything you wish on each line. Math and search capabilities let you do complex expense and billing breakouts. IBM, however, claims that "Most people can learn to use Time Manager effectively within a short time, usually within an hour." Don't bet your monochrome display on it.

Time Manager requires a 64K machine with PC-DOS and one disk drive, and supports either 40- or 80-column displays.

A COMPUTER
is not a blender.

Using 80 columns and putting a whole year's worth of data on one disk, you're limited to 192 entries per month; you can write 256 entries per month on a disk formatted for half a year. In 40-column mode, these numbers double. Each 80-column entry can include up to 62 characters of text (30 in the 40-column version), and multi-line entries are possible. Using double-sided drives does not increase capacity; a shame, since the extra storage might well come in handy.

Reading the Calendar

First, Time Manager displays an on-screen calendar for the current month. A date in inverse video has at least one calendar entry connected to it; the others have none. You use the cursor keys to move a pointer around the calendar. Sending the pointer up or down the screen takes you to the previous month or to the following month. You can also change the month by using the PgUp and PgDn keys or by entering the month's number. The calendars run from 1901 through 2155.

Positioning the pointer at a particular day of the month and hitting the Enter key brings forth the calendar page for that day. At this "day level," you can quickly move forward or backward. For example, the tab key will take you to the next date that contains at least one entry; the backtab will go to the previous date with an entry.

Priority Levels

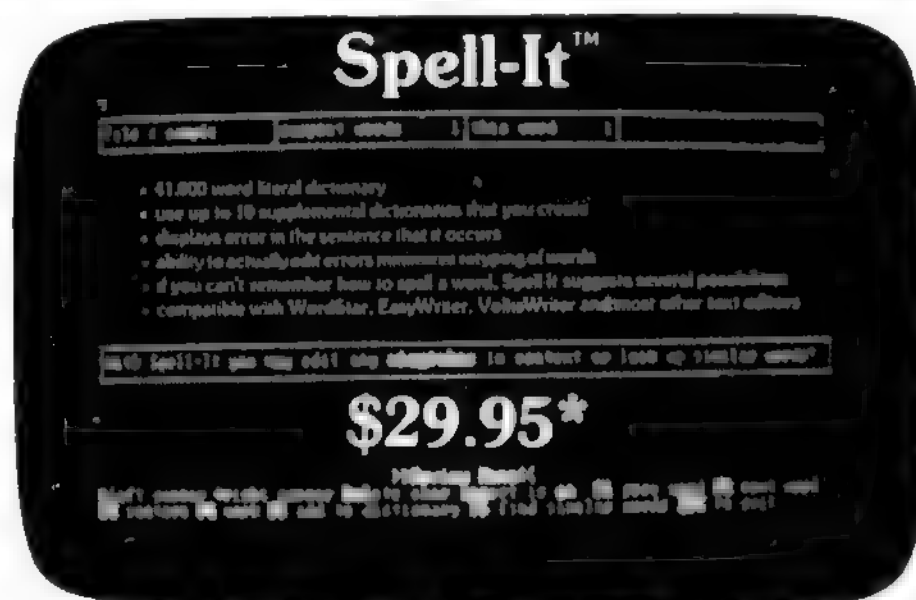
Entries must be assigned to one of four priority levels. Starred (*) items indicate the entries of greatest importance; they

appear at the top of the current day's schedule, and they continue to appear each day until you mark them complete or

THOUGH
speed seems to be a
distinct advantage in a
time management
program, it can also be
a disadvantage.

delete them. "A" items are appointments; they are sorted according to the time of day. Items with 2, 1, and N (note) priority appear on the calendar in descending order. Within each priority level, appointments are sorted by category.

The 26 categories, one for each letter of the alphabet, have already been titled, but



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System requirements

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80 column display, and PC DOS

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you can change their names to suit your needs. You may also mark a special entry such as a birthday or an anniversary "permanent," which makes it easy to retain on a subsequent year's disk. There are two ways to do this, but unfortunately, neither one is documented on the help screens or on the quick reference card. Jotting the procedures down on the card will save you from constantly searching through the poorly indexed manual.

Entering Text

The rest of an entry line is devoted to your text, which can include just about anything you want. A line editor allows you to delete items as they are taken care of, or "cross them out" to retain a complete record of your activities. To insert text, however, you must use the insert key to fill an area with spaces, then type over the spaces. In addition, you can move and copy entries from one day to another, and a forgiving buffer lets you undo deletions. You can even make entries recur, for example, every fourth Wednesday. About

the only kind of appointment have to copy individually is the "third Tuesday of every month" variety.

One word of caution: *Time Manager* is fast. Though speed seems to be a distinct advantage in a time management program, it can also be a disadvantage. The moment you alter a category or priority code, the entry you're working on is sorted, and it's apt to scoot to another position on the screen. This happens so quickly, it's almost unnoticeable, and since the pointers keep their position above whatever takes the old entry's place, it can lead you to make an accidental change in the new entry.

Using the Commands

Most commands are preceded with a slash. If you type /C and another letter, you can select only entries filed under the category to which the letter corresponds. Typing /L lets you select only the entries above a certain priority. /K lets you search for a keyword or a keyword combination of up to 25 characters. Upper and lower

case distinctions are mercifully ignored, and you can use question marks (but not asterisks) as wildcards in the same way as in DOS.

To demonstrate how these commands work, let's suppose you want to look for all your dealings with Cheese City. All you have to do is type in /K and Cheese City. Every non-Cheese City appointment will magically disappear. To scan forward, press the tab key, and *Time Manager* will take you to the next entry that contains Cheese City. To see only your appointments with Cheese City, you can type /L followed by an A, limiting the search still further.

Keep in mind, however, that even though the entry is displayed in inverse

ANOTHER
problem with *Time Manager* is that it allows no margin for error.

video, the fact that you're in this "limited mode" can be easy to miss. Though you may think you have nothing scheduled, you may actually have a full schedule that just doesn't contain any appointments with Cheese City.

Accounts and Data Formats

Time Manager gives you nine accounts to play with, and you can call them anything you want. You can enter as many account items as will fit on each line, and you can even multiply numeric data (by integers only) to make an annual projection from the first month's data. Unfortunately, you have to enter your data in formats such as !100.37, @45.22, &5499, and \$56.66, which can be confusing.

To break the code, consult your PC keyboard. Whenever you want to post a numeric entry to a given account, you must precede it by the symbol directly above the account number on the top row of keys. For example, \$56.66 does not refer to the amount of money in your bank account—it simply indicates that 56.66 of something is applied to the account num-



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ber 4.

Another problem with *Time Manager* is that it allows no margin for error. The program will do its computations inaccu-

YOU CAN
*fearlessly move your
cursor all over the
screen, which is not
possible even in
WordStar.*

ately if you enter any non-numeric character (with the exception of a minus sign) immediately following the accounting symbol or if you end the numeric entry with a decimal point rather than a digit.

Record Keeping

Given the ten accounts and the 26 pos-

sible categories, you can pull out all sorts of reports. You can also keep track of payables and receivables for a number of different subcontractors, or create breakdowns of expenses by category. You can also compute running totals or break out totals for a few days, a month, or a year. You can even use negative numbers, something the manual touts as being useful for keeping accounts payable and accounts receivable records.

On the other hand, you must remember to clear the account registers every time you start a new computation; this makes the screen of accounts disappear. You may have to call the screen up again to make sure you really did clear the totals instead of doing something else. This is easy to forget, a genuine nuisance, but absolutely mandatory if you want your computations to come out right. It should have been programmed to be automatic.

Time Manager gives you six "note-pads" (12 in the 40-column version). These are blank screens on which you can write whatever you wish. A powerful full-

screen editor is also included. Although a few of the commands take some getting used to, you can fearlessly move your cursor all over the screen, which is not possible even in *Wordstar*. In this equivalent of the back of the book you can keep memos, phone numbers, or a list of the abbreviations you use in your *Time Manager* entries.

Time Manager features two printing functions: Ctrl-P, which is similar to our old friend PrtSc; and a global printing feature, which allows you to do the same sort of keyword, category, and priority selection as in the rest of the program over any desired range of dates. But again, the accounting function is rather disappointing. There's no way to print out accounting information except by the Ctrl-P method, which generates a very nice-looking report that unfortunately includes a bunch of irrelevant prompts at the bottom.

Time Manager almost literally comes with bells and whistles. Every time you move from one day to the next, you hear a tone that gets higher and higher as you move forward through the month. Some users may be tempted to try playing "The Dance of the Hours," "Time on My Hands," or "September Song." Fortunately, this feature can be disabled. So can the buzzer, an alarm that goes off at a certain time each day and keeps beeping until you tell it to stop.

Time Manager can compute the number of days between two dates. It can find out what the date will be 50 weeks from now. And it will let you make multi-line entries, though nothing beyond line one will show up in a keyword search.

Keyboard Snafus

Other quibbles? A few. Some of the keys are not consistent. The Escape key, for example, usually saves your work and returns you to the previous level. But from the line editor, this key takes you back to the previous level without saving anything. The space bar sometimes works normally and sometimes sends you into an editing mode. The function keys are not assigned logically, and neither the onscreen help menus nor the reference card displays them in a rational order. There is also a lack of support for double-sided drives.

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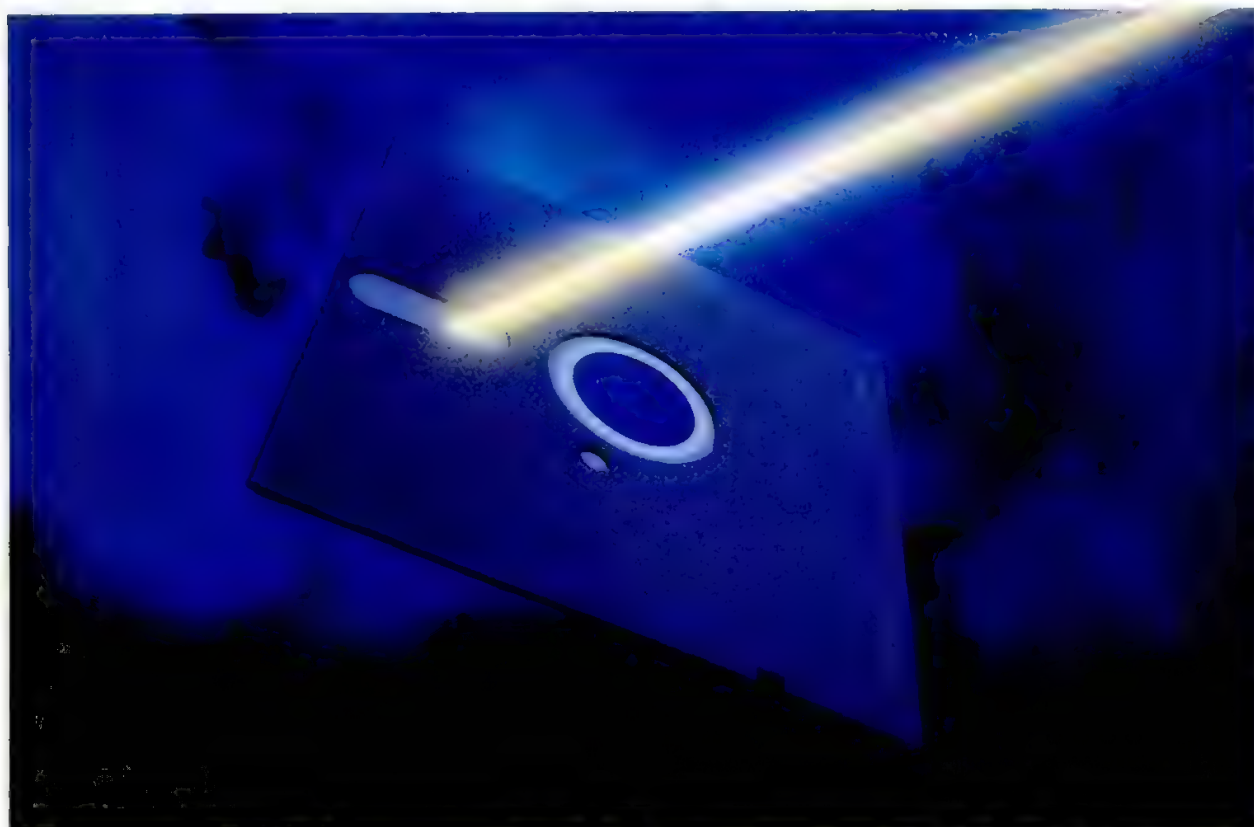
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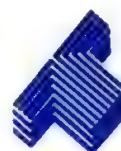
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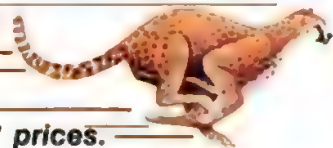


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ring-bound manual is not a model of organization, and the index is less than helpful. From the documentation, I am still not positive that I know when the program has saved new entries to disk. And did you know that your PC has a "load lever"? That's what the manual calls the hunk of metal at the front of your disk drives. You probably refer to it as a "door."

There's also IBM's notorious software support, that includes no address or phone number for help but advises you to "consult your authorized IBM Personal Computer dealer." Companies generally provide hot lines for two reasons: first, to help people out, and second, to find out what needs fixing. IBM's misguided policy misses on both counts. Unfortunately, if you've got a problem you can't solve by reading the manual, chances are that your authorized dealer won't be able to solve it either. Still, the online help and reference card will get you out of most jams. A disk contains examples that are referred to in the text, giving you a real feel for how the program works. Error trapping is good (I couldn't cause any program crashes); operation is speedy; and despite my annoyance with the manual, its biggest drawback is a lack of information on how to stop using the program.

So why, aside from my quibbles with the program, won't I be using *Time Manager*? In two words: copy protection. According to the instructions, you may make only one copy of your program disk, a procedure that requires nine disk swaps (even on a 320K system) since it must be completed on only one drive. When you keep getting the same prompts over and over and the manual has given you no clues as to how long the normally simple process is supposed to take, you can be excused for thinking something is dreadfully wrong. It is, but only with the dimbulbs who dreamed up this scheme.

I am told by someone who tried it that failure to adhere to the copying procedures in the manual can turn your master disk to gibberish. That master disk, incidentally, doesn't even have a hub ring. And I wonder what happens with a copy-once disk if you should try to copy it onto a brand-new disk with a couple of bad sectors. Three loud Bronx cheers to IBM for this policy.

And a fourth, fifth and sixth for doing it on this particular program. Unless it's ready to go at the touch of a couple of keys,



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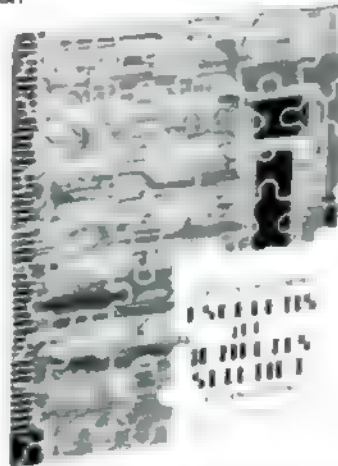
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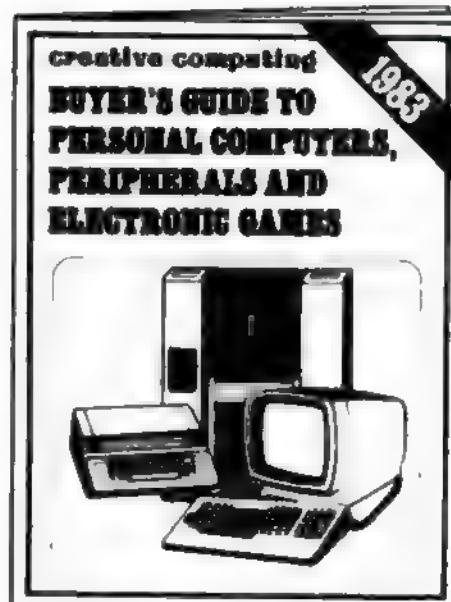
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a program like Time Manager is nigh unto worthless. If I could leave it online in my RAM disk emulator (or on a hard disk if I had one), it might be very handy indeed. But I can't.

Even if I could, it wouldn't help all that much. The only way I can find to exit the

*FAILURE TO
adhere to the copying
procedures in the
manual can turn your
master disk to
gibberish.*

program and get back into DOS is to do a full three-key reset. This is another fundamental design flaw that sabotages what is otherwise a rather nice piece of software.

If I had to hazard a guess, I'd suspect this program will eventually be available in a version that will work as an integrated unit with Microsoft's Multiplan and its long-rumored Multiword. Right now, it's on its own, aloof and haughty as a dethroned monarch.

Personal Datebook
Organic Software
Distributed by
Digital Marketing Corporation
2670 Cherry Lane
Walnut Creek, CA 94596
(415) 938-2880
List Price: \$300

CIRCLE 605 ON READER SERVICE CARD

Personal Datebook

One thing Time Manager won't do is automatically avoid schedule conflicts or search your schedule to see when you've got a free 2-hour time slot. To get your machine to do this, you need a program like Personal Datebook.

Personal Datebook is designed to let you find open appointment slots in a calendar. It can examine a group of schedules to find out who's free for a conference, print out calendars for a given period, and conduct searches to find out when a cer-

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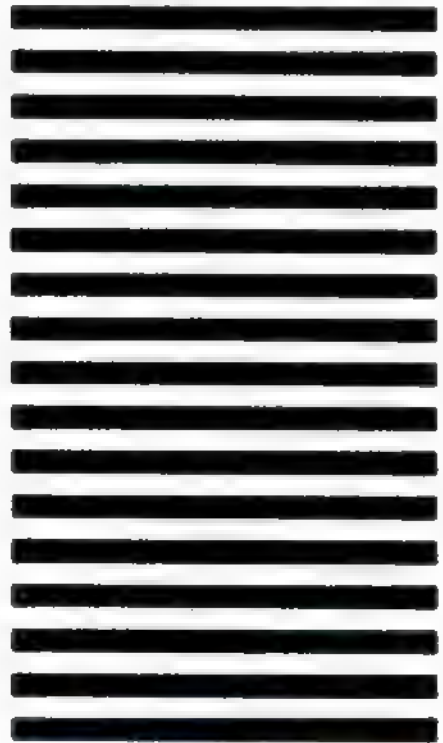


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tain client has appointments scheduled. On the other hand, *Personal Datebook* has none of the math functions of *Time Manager*; it can't handle untimed items such as "memory joggers," birthdays, or general reminders, and it won't do multiple entries automatically.

Accidents Will Happen

Personal Datebook runs from CP/M-86,

PERSONAL
*Datebook is designed to
let you find open
appointment slots in a
calendar.*

but it's been brought over from the 8-bit world without much special consideration. For example files are referred to by a

COM extension in the documentation, but called CMD on the disk. The manual makes no reference to the PC (or even to CP/M-86), and the only PC-specific item is a selection on the installation menu. Worse, the program neither uses nor disables the IBM function keys. These keys simply put out the same strings of characters as they do in CP/M-86 command level. An accidental brush of the F6 key causes *Personal Datebook* to examine every character in the string `pip b:a:*. *[v]`. Needless to say, this can lead to unfortunate accidental commands.

Worse still, the cursor keys in CP/M-86 have been assigned a peculiar set of control characters and symbols, making it possible to exit the program with one accidental keystroke. Since the cursors are totally useless for data entry within the program they and the function keys should have been disabled. Anyone using *Personal Datebook* on a PC would be well advised to shift the Num Lock before proceeding.

Personal Datebook works with a 12-

hour day, if, for example, you set the first hour for 7 a.m., your scheduled appointments must end at 7 p.m. Don't plan on using this program to list your dinner engagements or your hot dates, unless they occur during working hours.

Scheduling

With *Personal Datebook*, you can store schedules for up to nine people, but the more schedules you enter, the less storage per person. By my calculation, with a schedule for nine people, you would be limited to a range of about 28 days, with a total of 120 appointments per person on a 320K RAM system. With one person, you could schedule up to 168 days, with a total of 2,000 appointments. If you have many short appointments (such as a visit to the dentist's office), you can decrease the time range; but once you've chosen it (by using a formula or a graph provided in the manual), you can't change it.

A data disk must be installed for each person whose schedules will appear on it. Among the items you must select are the beginning hour of the day and the time interval—10, 15, 20, or 30 minutes. You also choose your days off and your lunch hour. Again, none of this may be altered once you have begun entering data.

"Because computer hardware sometimes fails," says the manual, "there is a small chance that you will lose track of some appointments." To avoid this, you can keep a log of new entries and changes either on the printer or on disk—but not on both. If you choose the printer as the logging device, it must be turned on when-

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IF YOU SET
the first hour for 7 a.m.,
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ever you're working with *Personal Datebook*, and it will spit out a line of type each time you make an entry, even when you do it by accident.

Each time you run *Personal Datebook*, a menu asks for the date and warns that the program is about to discard all past

appointments. You have the option of printing these out before the erasure is performed. This is an advisable procedure because there's no other way to keep a permanent record of past appointments.

You can work with only one person's schedules at a time. After selecting the schedules you want to see, you get a two-column list of today's appointments with a space for each interval. You probably won't be able to see the whole day, but you can change the starting hour of the display. Unfortunately, there isn't much room for each entry, since you're limited to 20 characters per name and 30 characters per time slot. That may be fine for longer appointments, but it's a potential problem for shorter ones.

You can move to another day's schedule by entering either a new date or a command such as +5d (forward 5 days). Since the N key also takes you to the next day, you could hit it five times to go forward 5 days. This would not be a good idea, however, because the program would rewrite the screen five times. Screen rewriting takes about 7 seconds—nearly twice as long as it takes with WordStar.

For some reason, writers of time management programs seem to want to revolu-

for the cursor keys. Don't.

Finding an Opening

To search for open appointment slots, you must specify the length of time needed, the first and last acceptable days, the acceptable days of the week, and the first and last possible hours. The program then produces a list of openings displayed as a menu. The schedule for the day you select can be accessed with a couple of keystrokes. Overlapping appointments or appointments made on weekends or days off must be confirmed.

Breaking Appointments

Canceled appointments can be stored in a "reschedule area." There's also a "future list" for appointments scheduled beyond the normal range of the calendar. As the program is updated, appointments on this list move into the current calendar. There's room in this section for only 40 items per schedule.

Appointments for a given day can be printed out with a few simple commands. Though these commands appear in two

column on the screen, they are actually printed in only one column. Another option allows you to search for a particular client's appointments. A search for R

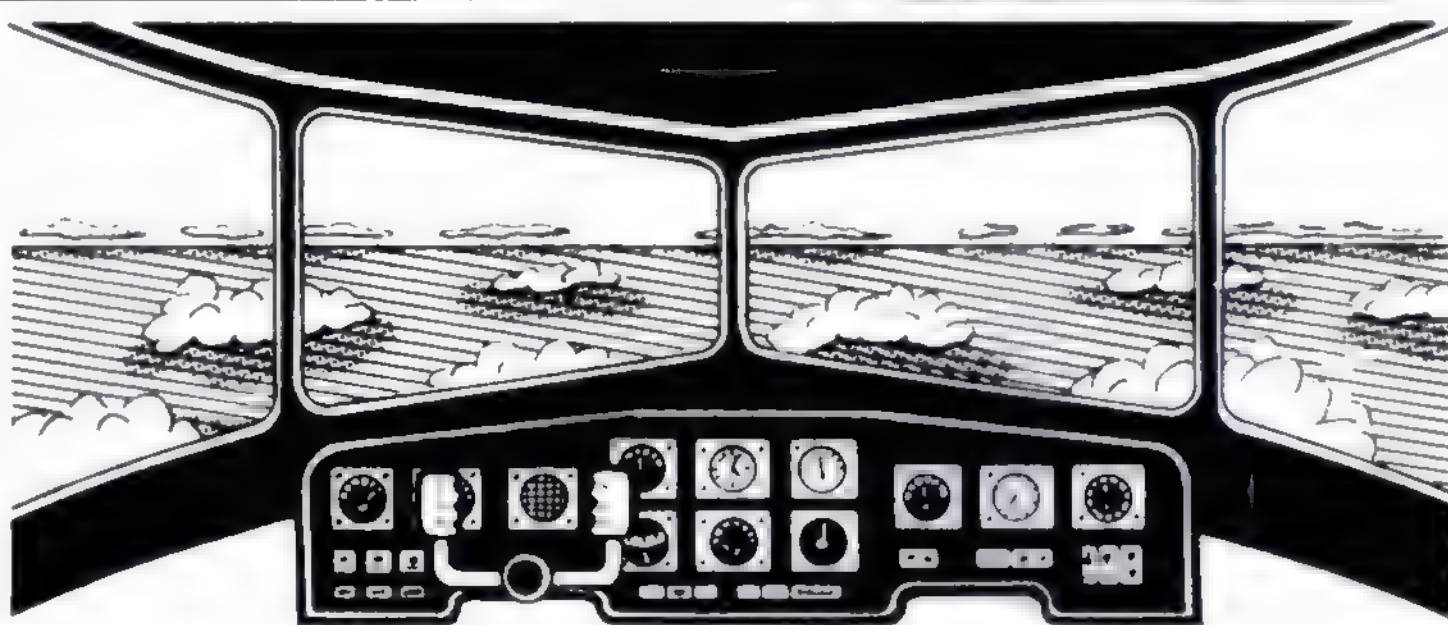
SCREEN
rewriting takes about 7 seconds—nearly twice as long as it takes with WordStar.

in a sample file I created produced the files for Dave Jones and John Smith, along with the one entry whose name actually included that letter.

To schedule conferences, go to the group conference menu and enter the date, time, length, and reason. Then, press E to examine all the files. If everyone is able to attend, press S and schedule a

WITH PERSONAL
*Datebook you can store
schedules for up to nine
people but the more
schedules you enter the
less storage per person.*

tionize the process of data entry. In Personal Datebook, there's usually some sort of entry already in every data field, often (but not always) the last item you worked with. Therefore, you may feel that you're always correcting data rather than entering it. When you type your first new character in an alphabetic field, the old entry disappears and the field (in inverse video) widens to show you (via a string of dots) how many characters you may enter. But entering numeric data always involves typing over old stuff. It's extremely irritating, and there's a strong impulse to reach



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meeting. If not, you are given a message stating the names of the busy parties. You then have the option of including or excluding anyone or changing the time and reexamining the schedules. The program, however, will not search for a time when everyone can meet. The first time I tried it, the program set up a conference on one of the participant's days off.

Man Vs. Machine

Despite the complete omission of information on the CP/M-86 and the PC and the inclusion of irrelevant information concerning UCSD p-system versions, the typewritten, notebook-binder documentation for this program is fairly good and features plenty of sample screens. It does not, however, make up for the problems abounding in the program. For instance, the program can hang without an error message if your printer happens to be off line. When it does give you a printer error message, it's a terse and confusing one from CP/M-86. Though there are always onscreen mini-menus to guide you, the one-stroke commands are inconsistent. An important onscreen installation warning is almost unreadable because it appears partially in Greek and partially in other foreign characters instead of in English. Other onscreen messages are sometimes ambiguous and occasionally incorrect. The disk drives make more of a racket than with any other program I've ever run, and the problems with the cursor and function keys are utterly

unforgivable.

In addition, *Personal Datebook* is slow; frequently, you'll have to wait for menus and screen updates. As a tool it's painfully slow; a good receptionist could scan an "At-a-Glance" calendar and find a line of free space in a five-person office long before this program could. Ultimately I can't envision anyone really saving time by using *Personal Datebook* instead of a standard calendar.

The manual warns "Never, never turn off your computer without ending *Personal Datebook* by selecting the Quit option from the group selection menu. Failing to end *Personal Datebook* this way may lose

THE DISK drives make more of a racket than with any other program I've ever run.

important information." Would you swear that no one in a busy office would ever decide to help out by turning off a machine because "no one is using it"? Indeed, would you swear that no one would ever hit Ctrl-Break, accidentally; a mistake that aborts the program with equally grim results?

If you still plan on using this program, you should also plan on dedicating your PC to it during working hours. Why? First of all, people want to know now when they can get an appointment. Second, *Personal Datebook* can be copied and can probably run from any drive, to use it from MS-DOS you have to exit whatever program you were working with, do a three-key system reset, and boot-up an entirely different operating system. My advice: stick with the \$10 "At-a-Glance."

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CIRCLE 604 ON READER SERVICE CARD

The 25th Hour, 25:01—Time Scheduler/ Organizer by Softrend, Inc. sounds like a mouthful, but it has a certain elegance and simplicity. It generates appointment calendars on a 24-hour basis, lets you include untimed information, checks time conflicts, and handles an almost unlimited number of individuals or projects. It can also produce recurring entries, and it will allow you to scan for available time slots within certain limits. You can even enter two advance warning "ticklers" to remind yourself of a forthcoming event.

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- Query mode
- Same string option
- Ignore case option

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- Query mode
- One time or many times
- Same string option
- Ignore case option

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CIRCLE 117 ON READER SERVICE CARD

TEXTRA

Textra runs under PC/DOS and requires 64K of memory, and will work with either a monochrome adaptor or any monitor connected to a color/graphics adaptor.

old files, you can copy a disk for your records before wiping out old data. The screens are laid out cleanly, and the program uses the function keys in an odd but more consistent way than any of the other

25:01 PRINTS out better-looking reports than any of the other programs.

programs reviewed here. The screen will even tell you what each key does.

BASIC Problems

Why don't I like this program? One answer is BASIC. Often, everything stops, and 25:01 goes out to get a program segment from disk. This function takes too much time, as do many of the other functions. Each write of a repeating weekly entry takes more than 15 seconds—13 minutes to enter a single weekly event! In addition, there is no way to automatically enter a repeating event that ends before the year—for example, a 10-week-long weekly class.

Want a calendar? Just name your month and year, and onto the screen it comes. But for some reason, each week of the calendar runs from Monday to Sunday rather than from Sunday to Saturday. Though the manual mentions this anomaly it does not explain why.

Like *Personal Datebook*, 25:01 insists on giving you entry fields to modify, rather than blank spaces to fill up. But at least 25:01 allows you to use the cursor keys.

There is also no way to put a daily schedule on the screen. If you want to see a schedule, you have to get it from your printer. You must also use the printer before you can modify a record. This is necessary because the printer is the only place that contains the record number assigned to an individual entry, and you need this number to call each entry up.

Pluses and Minuses

25:01 prints out better-looking reports than any of the other programs. It will print a daily calendar with every time slot accounted for and every untimed entry

listed at the bottom, or it will print a calendar for a given period, with the starting times and ending times of each activity neatly computed. Unfortunately, the record number also appears on each report, and it can't be omitted. Since there is no search function available, you can't call up all your forthcoming appointments, and since there's no math capability, you can't keep a running total of your account.

Though the manual is wordy in some spots and vague in others, it contains many examples. Onscreen messages refer you to the proper section of the manual. Examples even appear on disk, though the manual doesn't give you this useful information. The examples do give you a reasonable idea of the program's capabilities and limitations.

Finally, though 25:01 can be copied and listed (though the program listing has no remarks) and it appears that it can run from any drive, its limitations aren't likely to save you 61 minutes in a day—or in a lifetime.

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Agenda

Agenda, another program written in BASIC, has screens that are as messy as 25:01's are clean. Since the version I received has been compiled (and requires a 128K system), it's reasonably fast. But speed and the ability to get the system time from DOS are about the only good things Agenda has going for it.

Agenda has a mixed bag of features that should be familiar by now. It allows you to make the same kind of entries as the other programs, but gives you only 28 characters of text per entry. It has user-definable expense codes, but it cannot handle any

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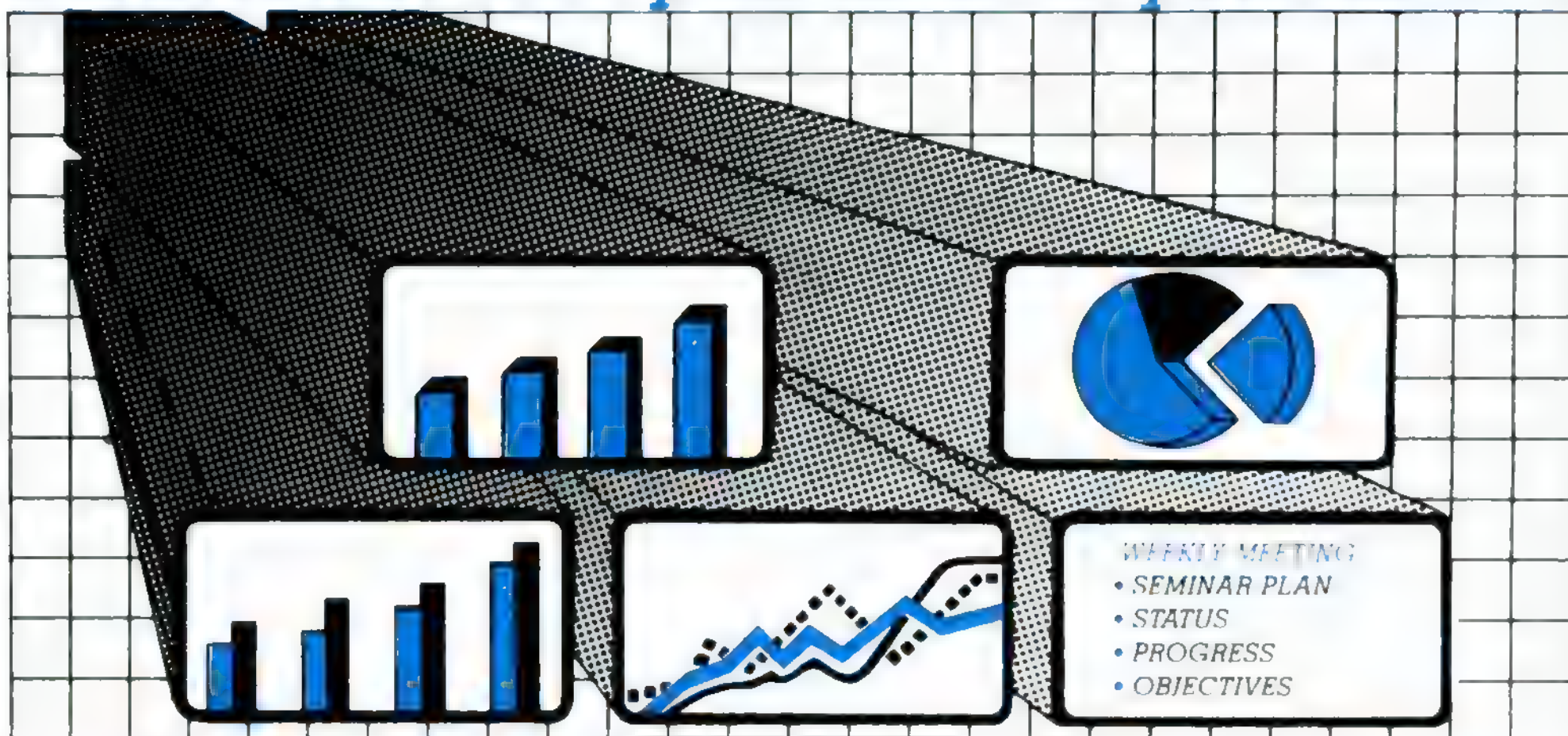
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expense of more than \$654. It can do some math, but seems to be limited to totaling how much you spent on a given day. You cannot enter expense data along with the rest of a record; you have to modify the

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CIRCLE 602 ON READER SERVICE CARD

AGENDA *is a model of sloppy programming.*

record to do it. Nor can it do searches, and as with 25:01, there's no way to terminate recurring entries (monthly and annually only).

Sloppy Programming

Agenda is a model of sloppy programming. It often deposits you in situations that don't seem to allow any graceful way out. Leave your printer off line and Agenda quits and drops you back to DOS. Type E, and you are entering data—except when E means "end data entry." Type X and you correct a data entry error—except when X is used to exit the program. Some error messages stay on the screen and clutter up the area where you're supposed to enter data; others flash by so quickly you can't even read them. The ambiguous "Redo and Start?" messages from BASIC appear when you try to enter non-numeric data in a numeric field.

In the manual, an extra r is attached to the end of the word recur whenever it appears. Calendar is consistently misspelled. The manual offers no advice whatsoever on what to do when the data disk fills up. Agenda does have one truly unique feature: the "secret option." By pressing one of the keys you can display the manufacturer's logo on the screen along with a digital clock. As another consolation, a pithy apothegm such as Theodore Roosevelt's "90 percent of all wisdom is being wise in time," heads each chapter.

I followed TR's implicit advice and stopped using Agenda.

Personal Secretary
Computer Aided Design
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Personal Secretary

The name *Personal Secretary* is probably meant to conjure up visions of an efficient aide-de-camp who anticipates your every need. Alas, *Personal Secretary* is a cut-rate copy of *Time Manager*, with primitive versions of many of its features.

You move a cursor around its calendar page, but the cursor movement has no logic. You enter and edit data a line at a time, but you can't make untimed entries. You get two accounts to play with, "Cost" and "Invoice," but when you try to compute a total, their names become "Reimbursables" and "Services". You get a lot of 10-second waits, during which the only activity on the screen is a blinking cursor. The program even forgets the time of day and demands that you re-enter it. This is one personal secretary bent on being chief

executive officer.

Secretarial Burn-out

The "daysheet" is the list of entries pertaining to a particular day. Multi-line entries are not allowed, and the program insists on depositing the "system time" on each new line. This entry almost always has to be changed. You can type over it, but you can't backtrack in order to correct errors. You can't always go forward, either, because the cursor and the backspace keys don't always work correctly. At least the line editor lets you make insertions logically, though at times, the screen could not keep up with my typing. I still don't know what happened to the characters I pushed off the right side of the screen.

Untimed items, such as reminders and general notes, are a definite problem. The program forces you to supply a time for every entry in the format 00:00 a.m. The manual claims that you may enter any combination of digits in the 00:00 section to organize data in other than temporal sequences. But when I entered 47:46 a.m.,

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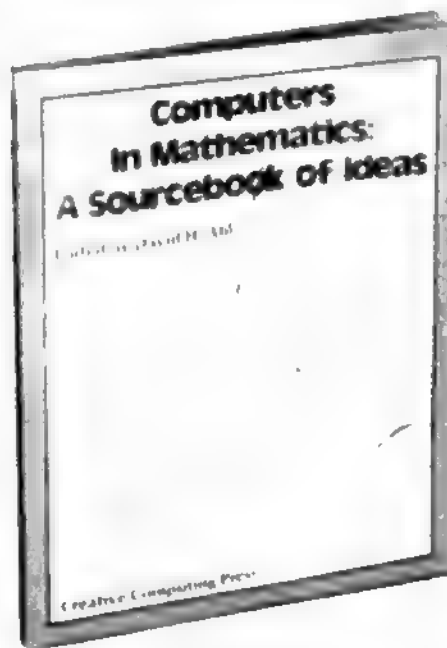
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the program changed it to 35:46 p.m.! Similar results were obtained with other numbers, including one that was changed twice.

PERSONAL

*Secretary is a cut-rate
copy of Time Manager
with primitive versions
of many of its features.*

Personal Secretary contains a search function, but it only considers identical matches, and it is the only function that works in upper and lower case. You can place a recurring entry on the same day for as many months as you choose, but there's no way of repeating an entry every day, week, or fortnight.

Words of Warning

The documentation for Personal Secretary is dismal. From reading the manual, you can barely figure out what the program is supposed to do. The manual does not include a single sample of a screen display or one specific example of data entry. But there is this friendly little note:

Before you start, one word of warning. The system must be closed by pressing key F10 every time you exchange Timefile Diskettes! If you do not do this, the system will not keep track of the correct number of files and you will need to manually repair the damage! This will require knowledge of the Disk Operating System.

What knowledge, the manual doesn't say. But roughly translated, if you foul up here even once, you are definitely out of luck.

The makers of Personal Secretary have also conveniently forgotten to list their telephone number. Resourceful complainants will find it listed with San Francisco directory assistance.

I once hired a personal secretary slightly more capable than this one. I fired her before lunch. /PC

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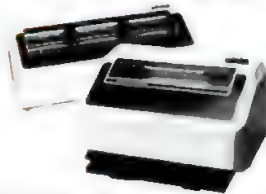


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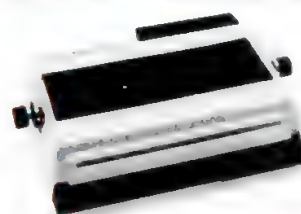
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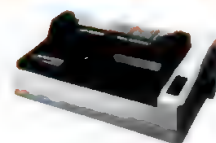


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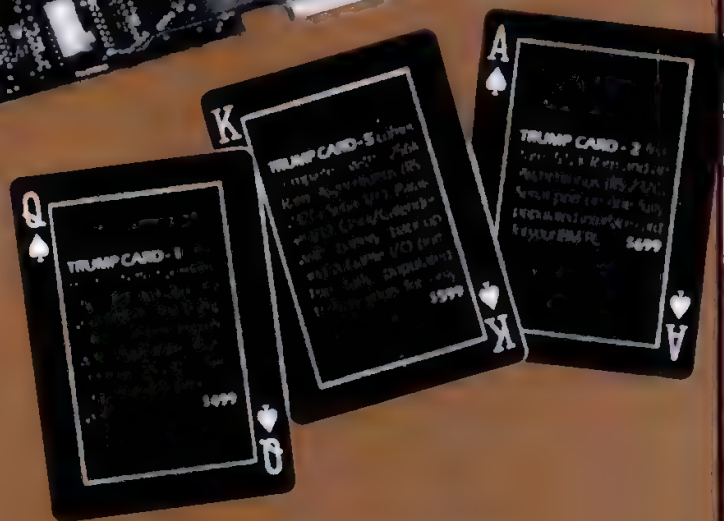
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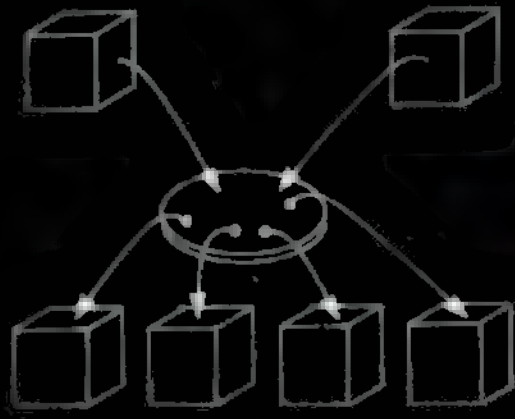
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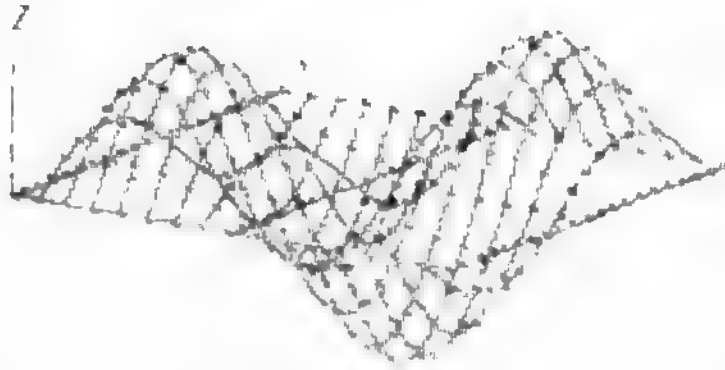
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SOFTKITS

Softkits contain complete, ready-to-run programs. The programs are modular, menu-driven and written in BASICA. They come fully-documented with listings, theory, equations and operating instructions. Use them as-is or modify and combine for custom applications. Softkit disks are copyable.



Data Plotting Software for the IBMpc

This softkit contains a system of 18 complete programs which process and display data: pie charts, bar charts, stock market charts, histograms, 3D views of surfaces, log plots, curve fitting, data management, histograms and statistical analysis.

Programs are modular, menu driven, written in BASICA, fully explained and keyed to theory. They are listed in the book alongside theory and equations. Use as-is or modify to best suit your own applications.

Four data base management programs are included. These create x, x-y, x-y-z and stock market data files and store them on disk. Plotting programs read the data files and carry out sorting, statistical analyses and plot results.

Features include automatic scaling, axis marking and numbering, auto replot when data changes, and a special program called LABELER which places text and symbols over graphics using a moving cursor.

□ Book with Disk: \$48

Engineering Software for the IBMpc

This softkit contains 25 fully-documented programs for computer-aided design and analysis on the IBMpc. They will show you how to write modern CAD software and use your PC for professional engineering work.

Emphasis is on combining computer graphics with engineering problem solving. Programs are included to interactively create engineering drawings, store them on disk, recall, update, merge, add physical properties such as resistance, thermal capacity and density, and rotate in 3 dimensions to produce isometric views.

After being stored on disk, the drawings may be recalled by applications programs which perform mechanisms simulation, heat transfer, matrix operations and optimization using Monte Carlo techniques. Programs are also included for Fourier Series and Transforms. These graphically display spectra alongside waveforms.

All programs are menu driven, written in BASICA and fully documented and keyed to theory and equations.

□ Book with Disk: \$48

IBMpc Graphics

This softkit is a self-teaching guide that will show you how to write your own 2 and 3 dimensional graphics software on the IBMpc, quickly and easily.

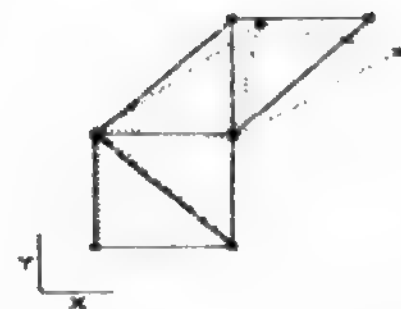
Learn how to create 2D and 3D shapes, translate, rotate, scale, stretch, clip, remove hidden lines, shade, create perspective views, calculate and plot surface intersections, produce animations effects, store graphics on disk.

Applications to science, education and business included. Also covers hardware needed for PC graphics, use of the PC's special graphics enhancements, and how to separate text from graphic on the PC's screen.

Contains 61 programs arranged in a tutorial manner leading from one step to the next. Math level is kept to a minimum and new concept are explained as they are used.

Much of this softkit is based on the popular *Graphic Software for Microcomputers* by B.J. Korites which was named "The Best Book on Microcomputer Graphics" by Creative Computing magazine.

□ Book with Disk: \$45



Structural Analysis Software for the IBMpc

These 11 programs will give you the ability to carry out sophisticated structural analyses on your IBMpc. They are modular, fully documented and ready to run.

You will be able to create a finite element mesh on the screen of your micro, rotate it in 3 dimensions, and store it on disk. Then recall the mesh from disk, recall a file of material properties and carry out a 3d truss or frame analysis. Shape of a deflected truss may be plotted over the original shape.

Programs also included for analysis of trusses with large deflections and non-linear material properties. These use an incremental solution strategy. Other programs calculate combined stresses and properties of beam cross sections.

Analyses use the modern "direct stiffness" method.

This system of programs is patterned after large-computer structural analysis systems such as ADINA and NASTRAN, but reduced in scale for micros. They were written by B. J. Korites, PhD, former CAD/CAM consultant to the Arthur D. Little Company.

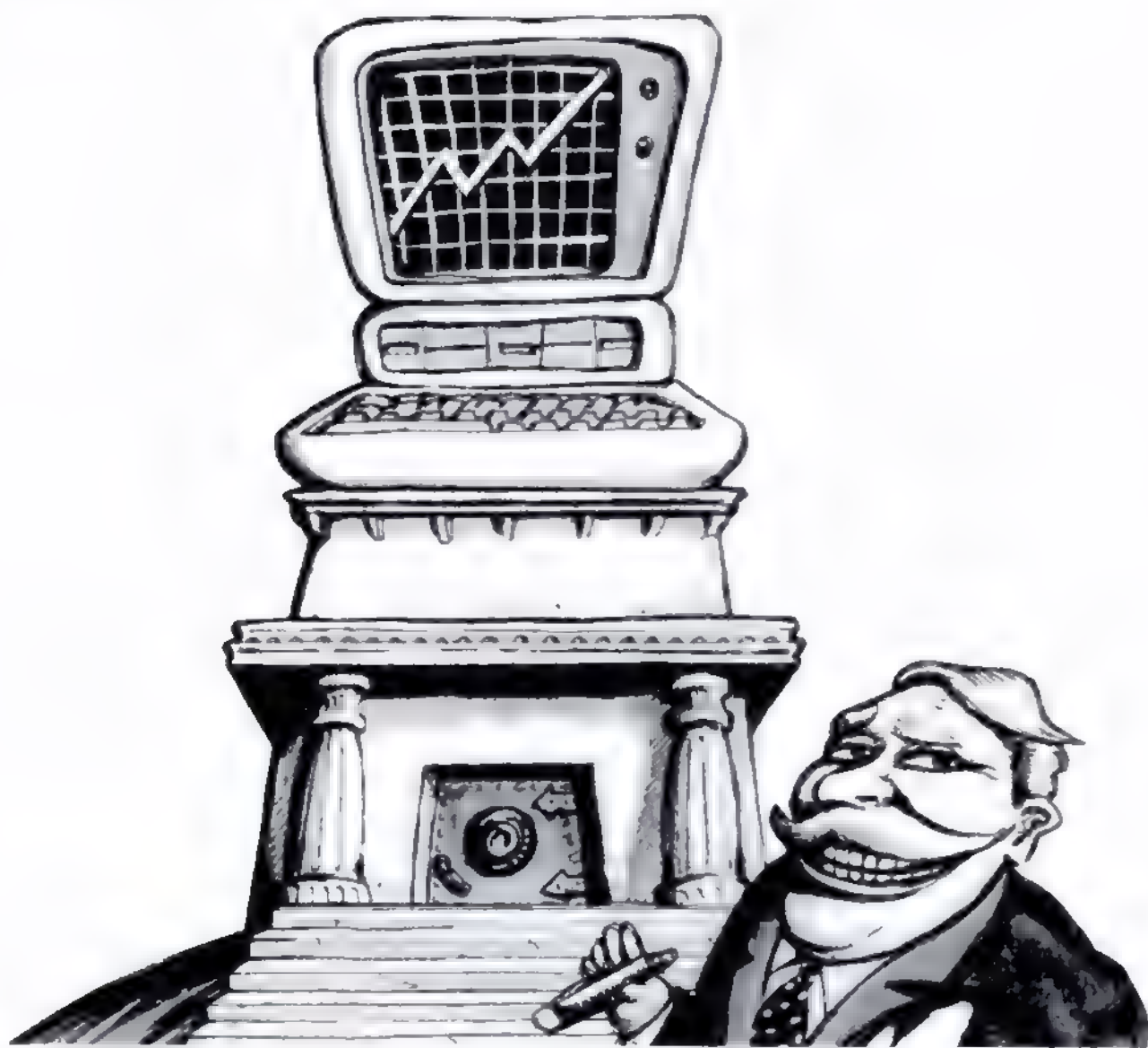
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PUBLICATIONS

This straightforward, well-conceived graphics and analysis package helps executives plot a course through a sea of numbers.



Beyond The Bottom Line With VisiTrend/Plot

VisiTrend/Plot
VisiCorp
2895 Zanker Rd.
San Jose, CA 95134
(408) 946-9000

List Price: \$300

Requires: 128K, one disk drive (two recommended), color graphics adapter, graphics monitor.

CIRCLE 596 ON READER SERVICE CARD

When confronted with a complex spreadsheet, the average executive is apt to make a mad dive for the bottom line.

We attach a great deal of importance to that revered figure, but in these modern times of wild business fluctuations, the

last line hardly tells the whole story. Though the rest of the story may be there,

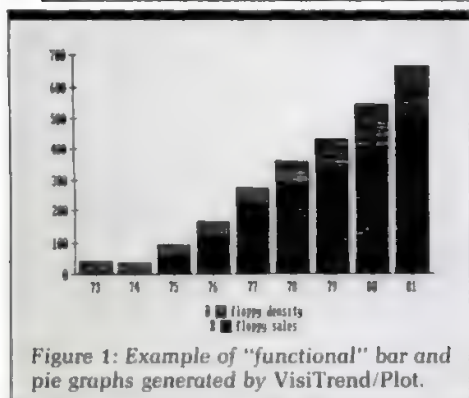
ENDLESS
*rows of numbers can
obscure the most vital
business information.*

the seemingly endless rows of numbers can obscure the most vital business information.

The problem of the bottom-line-bound executive (or any business analyst) is that he or she may not have time to deal intelligently with a computer-generated list of more numbers than are in a United States census report. Often there is no time to analyze them to get a true picture, no time to spot trends and flag impending disasters.

The IBM Personal Computer holds the promise of being the executive's dream come true. Not only is it mathematically able, a genuine 16-bit statistical whiz, but when properly outfitted with hardware and software, it can reveal the truth in graphic detail.

The rudiments are there in the form of



the BASIC graphic commands, but most executives don't have the time (or inclination) to learn enough programming to make the commands useful. Too, programming requires the ability to find the appropriate formula or algorithm to solve a problem; for untutored executives this is more difficult than the programming task itself.

What the computer-oriented executive needs, therefore, is an easy-to-use and easy-to-understand business analyzation and graphics software package.

With the ideal program, the harried businessperson could do the following: dump some numbers in and get an immediate reading of not only a growth trend but of how that growth is changing, compare the trend to leading economic indicators or the price of rough-cast doily futures, and get these results not just in vague numbers but in easily-grasped charts.

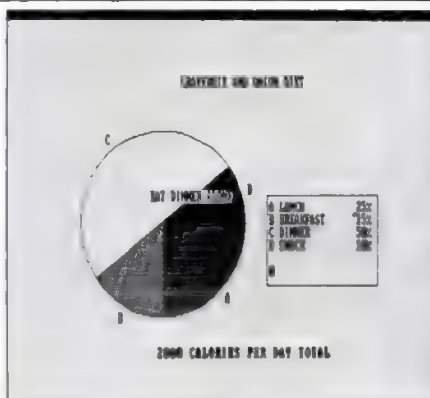
The Software Solution

One attempt to solve the dilemma, giving executives the software tools they

THE GRAPHICS are more utilitarian than flashy, proven rather than experimental.

need to answer mathematical problems they can't even write down, has resulted in VisiTrend/Plot.

This dual-purpose software package can analyze a series of numbers, such as monthly sales figures, and deduce an average trend revealing growth or decline and



how it is changing—hence the "Trend" part of its name. The same numbers can be used to plot line, bar, or pie charts on the PC's graphics monitor or generate them on paper—hence the "Plot."

And, most appealing to the novice, VisiTrend/Plot does both without requiring the executive to know how the computer operates or even how to type.

VisiTrend/Plot is a product of VisiCorp, perhaps best known for VisiCalc, the program credited with having sold more personal computers to business than Charlie Chaplin.

Like its sibling software, VisiTrend/Plot is a well-conceived and thoroughly thought-out product aimed at the business executive. It carries much of the Visi-philosophy with it—no frills and no frivolity, just get it done and down in black and white.

That's right, I said "black and white." Although VisiTrend demands, at minimum, 128K RAM, a color/graphics adapter, and a graphics-capable monitor, it views the world through monochrome glasses in black and white. (In the business environment, though, it's more likely to be black and green.)

Functions and Applications

The software carries some of the Visi-reputation with it, too. It is conservative—the graphics are more utilitarian than flashy, proven rather than experimental. While these screen images are both useful and able, they are far from pushing the limits of the PC's graphics capabilities.

Actually, graphics play a secondary role in the VisiTrend/Plot package: They merely display the results and meaning of the program's sophisticated mathematical manipulations.

The real power of VisiTrend/Plot, and its real value to the executive, is its easy-to-use statistical analysis tools. (These tools can be helpful in many scientific

applications, as well.)

After a little training you can take a series of values—from monthly sales to stock market prices to calorie intake—and use a few keystrokes to determine the change between each value, calculate a moving average over multiple months, determine the correlations between sales and profits at various levels of volume, compute a multiple regression equation to determine a straight-line business trend, shift periods for purposes of comparison, compute running totals, and even compute your own statistical transformations using your secret supply of magic formulas.

After you've completed the statistical manipulations, the "Plot" part of the program draws line, bar, or pie charts of your results. If you wish, you can graph

COMPUTE YOUR own statistical transformations using your secret stock of magic formulas.

your raw data without manipulating it further.

The program's uses are limited only by your imagination in applying statistics to your business.

VisiTrend/Plot will quickly draw a sales chart for the last 10 years or plot sales versus profits. But it can also average and smooth out data to show trends cleanly and unambiguously, plot the progress of your favorite stock with a "high-low-close" graph like those in the *Wall Street Journal*, and allow you to overlay a chart of this year's expenditures on one for the matching period from last year.

Documentation

One of the biggest shortcomings of most programs is their lack of useful documentation. It's like being turned loose on the Interstate highway system with neither a roadmap nor an owner's manual for your car.

VisiTrend/Plot doesn't cast you adrift. Its 200-page, loose-leaf manual both introduces you to the program and serves as a

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helpful reference later on.

The bulk of the manual is a tutorial, leading you step by step through the features of the program. The manual assumes nothing about your knowledge of the PC. In case you don't know how your keyboard works or what a cursor is, for instance, both are explained.

All instructions are explicit, down to such minute details as how to copy the PC-DOS operating system onto your program disks. References to the screen are nearly always illustrated with sample displays.

Be warned, however, that although the

instructions are easy to follow, you can't expect to be an instant VisiTrend/Plot expert. Just walking through the tutorial

THE BULK of the manual is a tutorial.

may take a whole working day or a lamp's worth of midnight oil.

For impatient users who believe that "when all else fails, it's time to look at the manual," the tutorial lists a summary of keyboard commands and functions after each chapter, and the manual's reference section describes each available function by name and tells how each one works.

The manual includes several appendices: a full explanation of all error messages, including what to do when you run into them, interface information for the handful of printers compatible with the program, explanations of file formats, and a glossary.

Although the manual does make a token effort to indicate what all the available statistical operations and analyzation techniques might be used for, applications information is rather scanty. You're left with the reassuring notion that VisiTrend/Plot will compute the Sum of Squared Residuals, the Standard Error of Regression, the Coefficient of Determination R, the Corrected Coefficient of Determina-

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VISITREND/PLOT is not designed to give you a full course in statistics.

tion R, and the Durbin-Watson Statistic, but without the slightest hint of what you can do with them all.

In other words, although VisiTrend/Plot is a statistical tool, the manual is not designed to give you a graduate course in statistics.

Running the Program

The first step in running VisiTrend/Plot is to install the PC-DOS operating system on the first of two program disks that VisiCorp supplies.

(Note: Because the software is copy-protected, you cannot make backups. You can only run the disks that you buy. If you inadvertently erase part of the program or damage the supplied disks, you can buy one set of replacements from VisiCorp for \$20. If you need another backup, you must start over and buy another copy of the program.)

After the DOS is installed, insert disk

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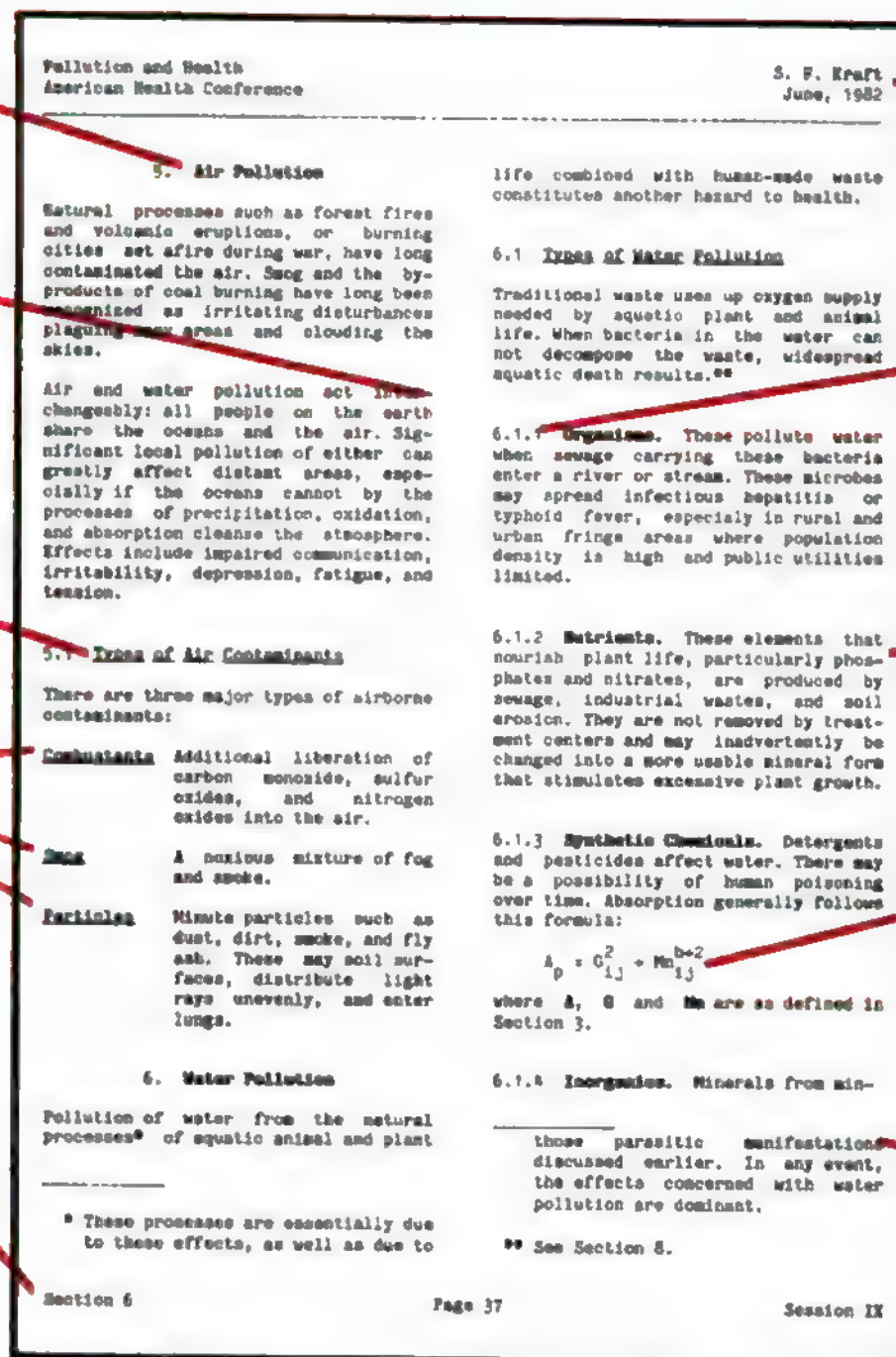
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one in slot A, boot up, and you're on your way. Once your PC digests the first disk, it asks for the second to be inserted in Drive A. In two-drive systems, no more disk

VISITREND/PLOT is entirely menu-driven.

shuffling will be necessary as long as you do not exit from VisiTrend/Plot into the PC-DOS operating system.

VisiTrend/Plot is entirely menu-driven. You implement your menu selection by positioning the cursor over what you want to do and pressing the Enter key.

This technique is probably the simplest and easiest way to operate a program, particularly for the computer illiterate. However, it can be frustrating for those accustomed to the "enter the number/letter on the menu" style of program, especially impatient users who try to think faster than the cursor moves.

Note that the VisiTrend/Plot selection process can take six keystrokes (or more, if you have a tendency toward clumsiness)

to start one function.

The program displays menus as a pair of horizontal bars with the various available selections listed between them. Superimposed in inverse video on the menu bars is explanatory information about the choice you've selected or operational information about the program, such as the name of the file you're working from. The main menu directs you into various subprograms, the most important of which includes the Trend and Plot features.

Steer the cursor onto the function you want and press the Enter key. Voila! Another menu. Move the cursor and press Enter again. You could spend all day chasing through menus; you also might get lost if you're not familiar with what you're doing. For instance, if you want to get back

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LEARNING

*VisiTrend/Plot's data
entry techniques will
add a new term to your
computer vocabulary:
"series."*

to the operating system and you're several menus down, you can have a mazelike chase to get out. It can feel like opening a box only to find another box inside.

However, the manual does provide a menu flowchart to help you find your way.

Entering Data

After you've selected a function, you choose one of two methods to get your data into VisiTrend/Plot: You can enter numbers directly after the proper menu choice, or you can read figures from files, even files generated by another program, such as VisiCalc.

Learning VisiTrend/Plot's data entry techniques will add a new term to your computer vocabulary: "series."

A series equals approximately one row or column of spreadsheet data. Each graph that the program displays and any data that the program analyzes must consist of one or more series.

You can pull out a series from nearly



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anywhere in any format-compatible file. The manual includes a lengthy explanation of what material is format-compatible—in short, any VisiTrend/Plot files and Data Interchange Format (DIF) files that can be shared with other Visi-programs.

If either your data or series is not complete, VisiTrend/Plot's "fill in" feature plugs the holes with interpolated values or extends the data with either arithmetic or geometric extrapolations. Multiple series can be compared to one another and analyzed and plotted on the same or separate graphs.

Because every series manipulation results in the creation of another series, you

**MORE THAN
the required 128K RAM
won't help because the
program can't use it.**

can soon be swimming in them and run out of working memory. Adding more

than the required 128K RAM to your system won't help because the program can't use it.

You quickly learn how to deploy your series. In my first efforts, I got carried away and had the same series appearing in six places. With experience, you also learn to use the "Clear" function frequently to delete unnecessary information from the working memory.

Although it may sound unnecessarily complex, once you work for a while with the series concept, it begins to make sense.

After your computations are finished, you have several options for displaying them. You can examine the new series you've created (a list of the percentage of sales growth for each month, for instance); you can get a statistical analysis of the data if you wish to ponder the standard deviation, or you can display the results graphically.

Graphics

The no-nonsense, businesslike Visi-approach translates into graphics that are

**MULTIPLE
lines can be plotted on a
single chart.**

best described as "functional" (see Figure 1). They look austere when compared to the multi-colored works of art that can be generated with other graphics programs.

There are some compensations that may warm up your feelings toward this program. No matter what sort of plot you choose, it's traced out quickly with the scale and range automatically determined. You're also given full control if you want to change the time base and scale.

Should you err in your choice and try to plot something that shoots off-scale, the program will warn you and refuse to display possibly-erroneous information.

The horizontal and vertical axes are automatically labeled with information derived from the file containing the series you chose to graph.

Multiple lines can be plotted on a single chart simply by selecting several series

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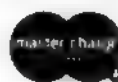
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with a like time base from the same file. Multiple plots on the same chart can be distinguished because each is displayed with different point markers—boxes, triangles, pound signs, and so on.

Should you wish, you can choose a background shading to suit your aesthetic sensibilities. Remember, it's monochrome; you get to choose your favorite color, as long as it's black, white, or one of two kinds of gray (fine and coarse). On my medium-resolution color monitor, the two grays appeared much the same. In print, however, there is a definite difference. The same shadings can be selected to turn

a line graph into an "area" graph.

Another background choice is a grid, which can have horizontal or vertical lines or both. This option is available for all graphs except pie charts.

Bar graphs are "two dimensional": no attempt was made to use extra perspective lines to make the bars seem to jump off of the page. Bars may be either horizontal or vertical. In horizontal mode a full-width/half-width option allows two series to be displayed with corresponding periods adjoining; the alternative is using stacked bars to show a total quantity and its constituents. After they are drawn, bars or

background can be shaded as you wish to suit your artistic temperament.

The roughly circular pie charts have stricter data requirements and are initially drawn only in outline. Afterward, you are allowed only the same four shading choices to dress it up.

THIS SOFTWARE supports a scant number of printers.

An additional chart—the high-low-close style of line graph—is aimed particularly at stock market gamblers.

Once your data is charted, you have the option of adding a single title above the graph, one to the side, up to three below, or any number of others that can be positioned by the keypad control, anywhere on the graph.

If you need more verbiage than the above options permit (these are provided within the confines of the plotting subprogram), additional text generated with another subprogram can be overlaid upon your graphics creations.

In the plot subprogram, only three typefaces are provided—normal, bold, and inverse video. On screen it is difficult to tell bold from normal. The text subprogram also allows for double-height characters.

Printers

Another example of the no-frills Visi-approach is that this software supports a scant number of printers: the Epson MX-80FT/IBM-standard-issue printer or the MX-100. All require the Grafrax option. By changing the program's printer driver, NEC models 5530 and 7730 and Okidata Microline 83A can also be used. (The printer driver is a software function handled in the "Plot" subprogram, which you only need to perform at installation or when changing printers.)

This printer-interfacing scheme means that you can start producing graphs and charts with little or no extra expense by using the same printer you use for everything else. Unfortunately, this also means that you cannot use plotters or—as is true throughout VisiTrend/Plot—colors. /PC

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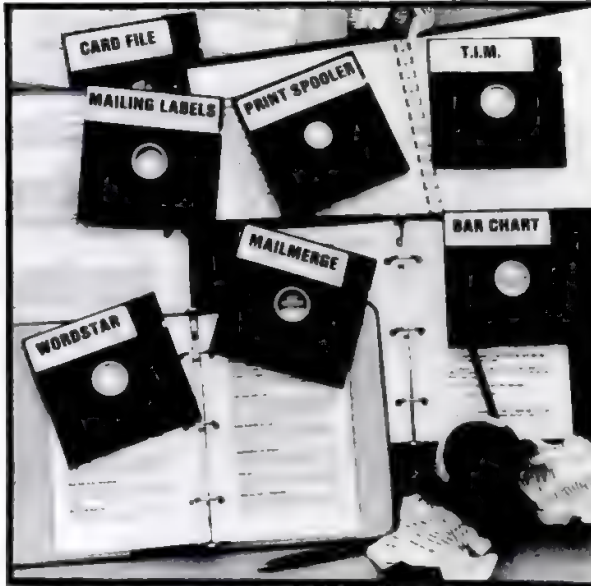
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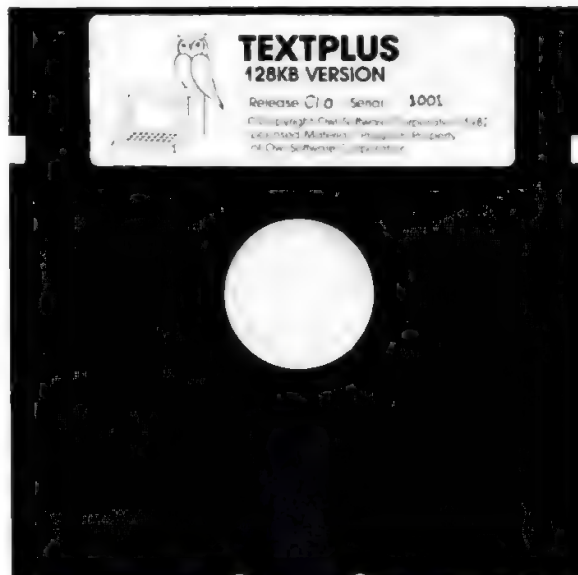
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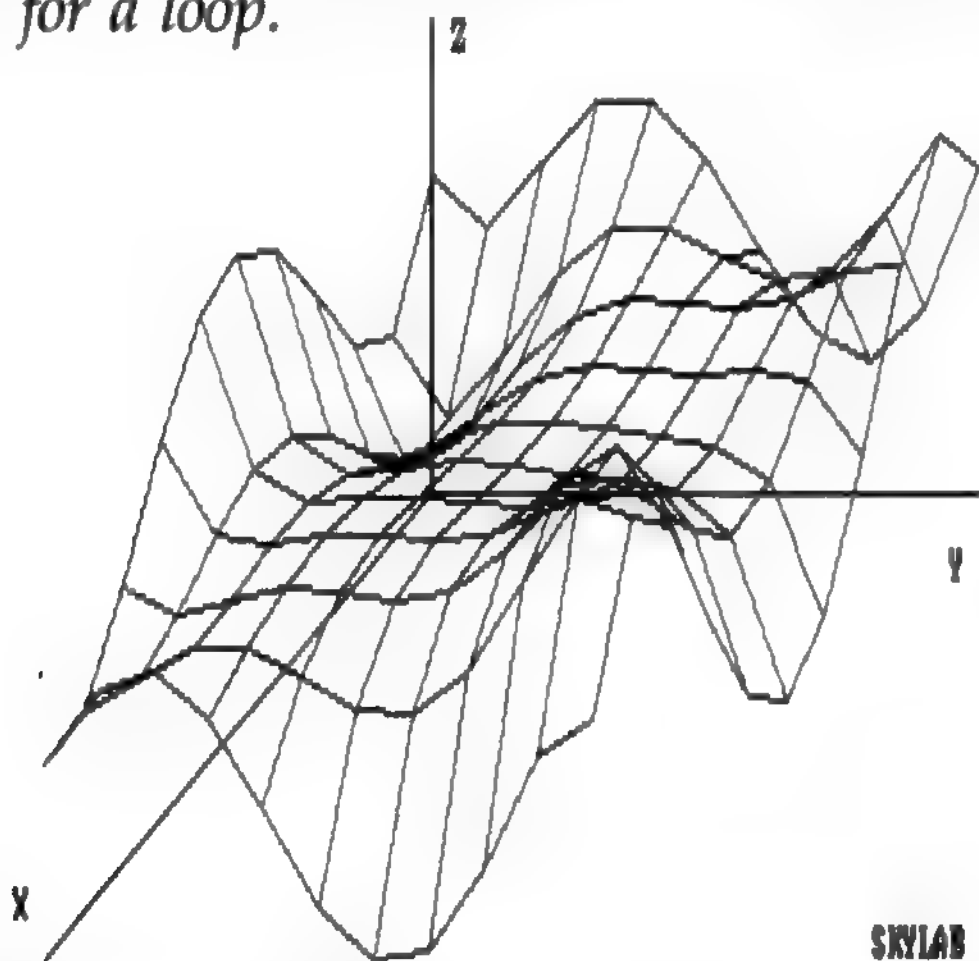
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Curvfit is a powerful data analysis tool that enables the IBM PC to make complex calculations formerly reserved for mainframe computers.

More concretely, this means that Curvfit takes raw numbers and plots them on a graph, drawing the simplest curve or 3-dimensional surface that connects them.

This amounts to more than merely connecting the dots. Curvfit analyzes data by finding a mathematical equation, the polynomial expression of a given order,

that best describes the data. Then it lets you see the results in graph form.

It can illustrate important trends for

CURVFIT IS
a powerful IBM PC to
make complex
calculations formerly
reserved for mainframe
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business people or show scientists how to best interpret their experiments or measurements.

Indeed, whenever it lives up to its potential, Curvfit is a useful, powerful software tool.

Its hardware requirements are relatively modest: 64K, a disk drive, and obviously, if you want to see graphics, a graphics monitor.

Encountering Curvfit

After playing with Curvfit for a while, I feel that it is the software equivalent of a funky little tome scribbled on coffee-stained notebooks by a Greenwich Village poet. The times appended to the file display—in the vicinity of 1 a.m.—bear out my mental image of a software scrivener copying disks by candlelight.

Curvfit's packaging is inauspicious—a thin plastic bag filled with a few loose sheets of paper and one floppy disk. Its documentation is forbidding, at least to the technically uninitiated. The pages are filled with notations that only an engineer can appreciate.

Deeper down, too, once the program lodges itself in drive A: you can see Curv-

ORDER= 5
 Xmin = 0
 Xmax = 2
 Ymin = 0
 Ymax = 2
 Zmin = 0
 Zmax = 2

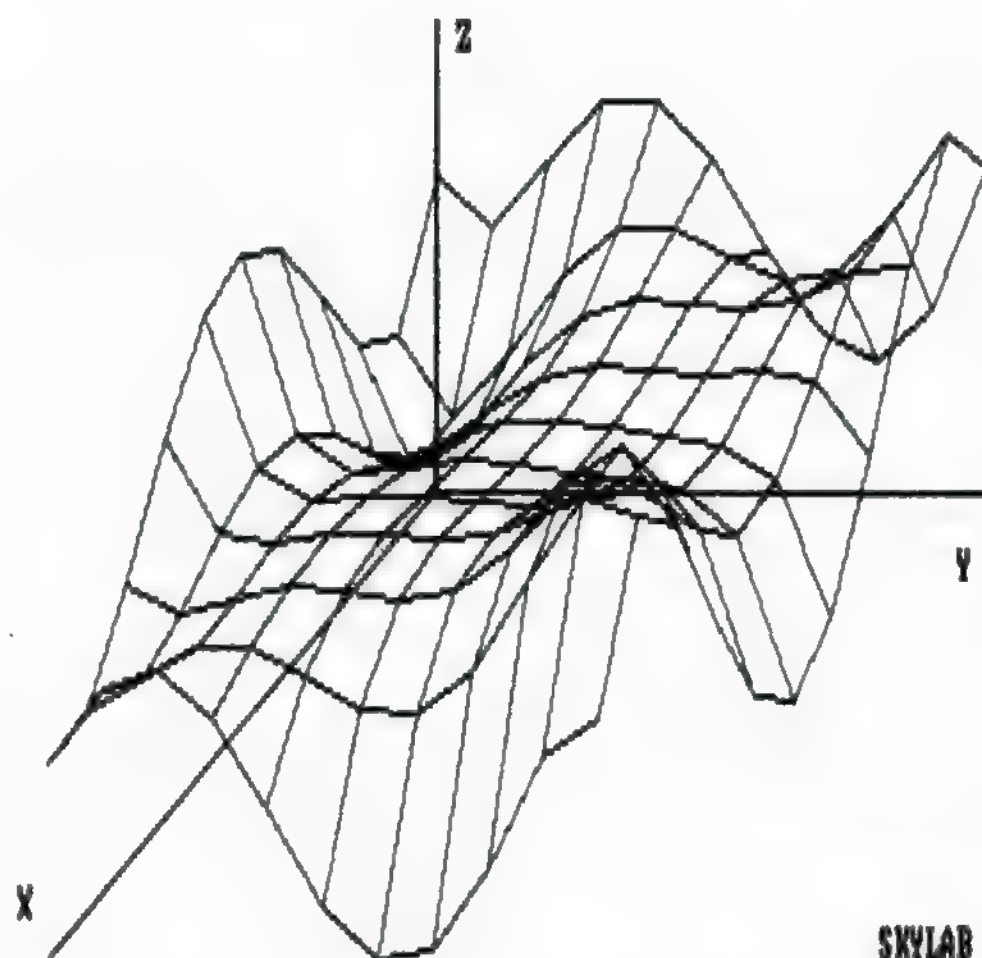


Figure 1: Example of Curvfit-3D, 5th order polynomial, random numbers.

fit's flaws. Curvfit 3-D could best be described as neat, useful (but could be better), easy to use (but could be much better), reasonably priced in relation to its value, and idiosyncratic.

The biggest hurdle you'll have to clear with Curvfit is the documentation, which is scanty and more academic than the average PC enthusiast will want to deal with.

"Scanty" means that the instructions for backing-up, loading, and running the

THE BIGGEST hurdle you'll have to clear with Curvfit is the documentation.

program, for instance, take only 2 inches of a 4-inch-wide column. Read "Step six," and you'll understand the philosophy of the documentation: "Follow screen

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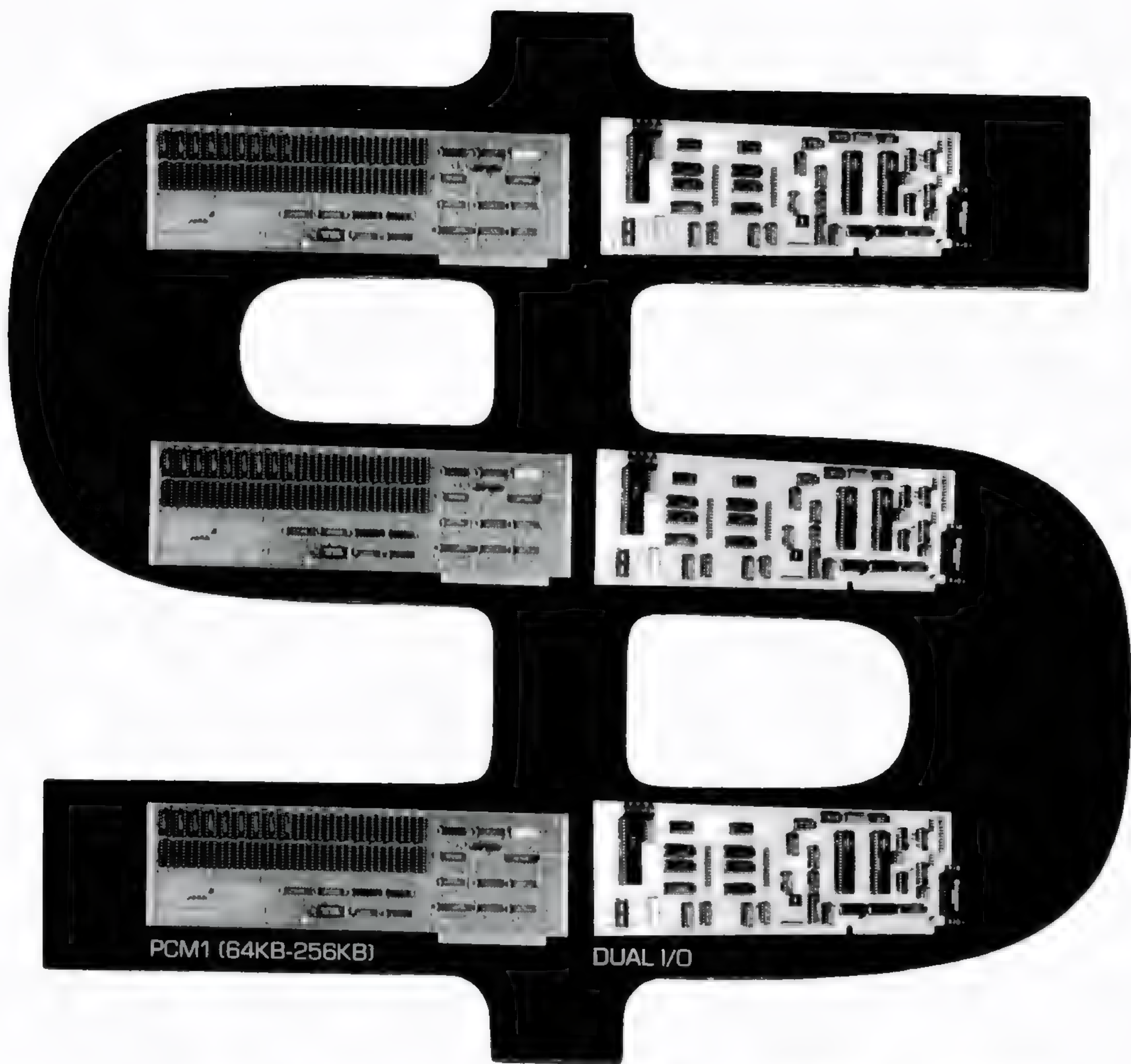
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 Xmax = 2
 Ymin = 0
 Ymax = 2
 Zmin = 0
 Zmax = 2

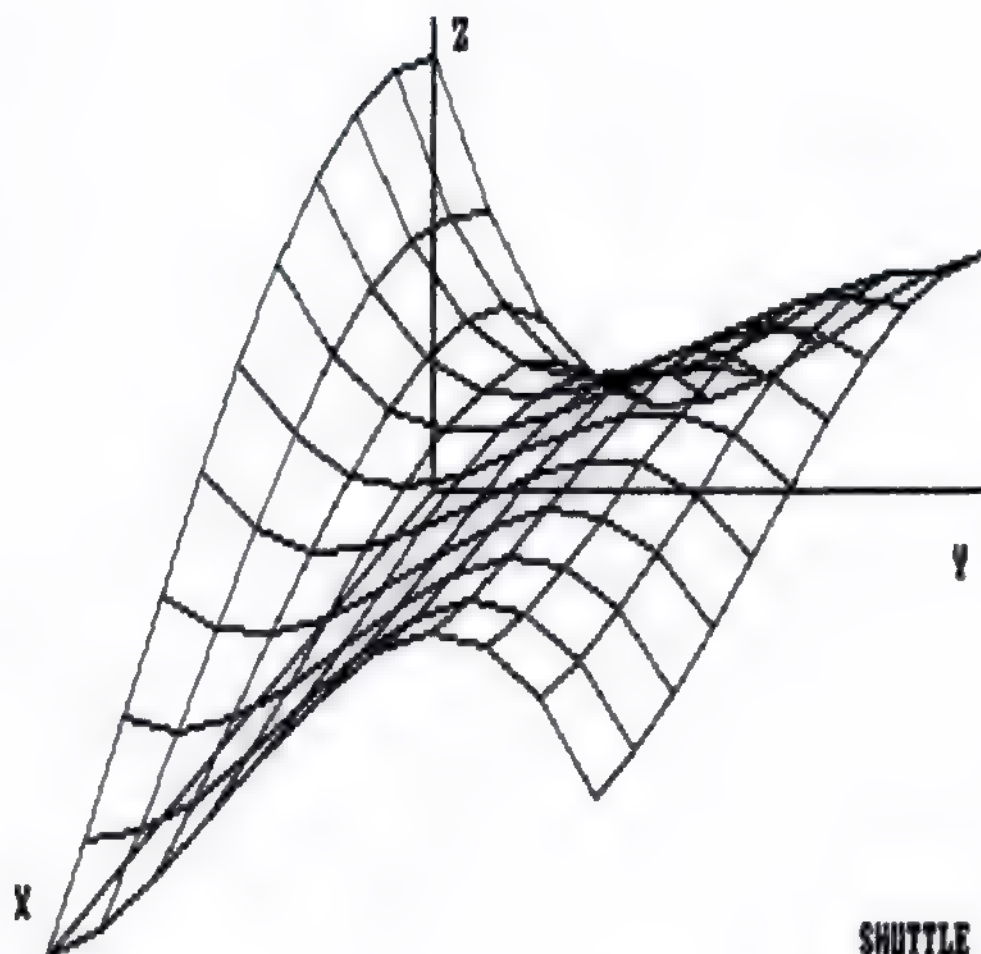


Figure 2: Example of Curvfit-3D, 3rd order polynomial, random numbers.

instructions until copy is complete."

Curvfit assumes a rudimentary knowledge of the workings of programs written in BASIC, so users must fumble their way through without guidance.

Once I toyed a while with the program, the documentation did make sense. Somehow, though, I thought it was supposed to work the other way around, with the documentation making sense of the program first.

Running Curvfit

If you've had any experience operating your PC, however, you'll have little problem running Curvfit the first time. The on-screen prompts explain themselves. Initial choices include a title for the data, destination (screen, printer, or file), the number of dimensions for plotting (two or three), the order of the polynomial to be derived (this is approximately equal to how many twists you want in your final curve), and the number of data points that you will supply to Curvfit to generate the final curve (see Figures 1 and 2).

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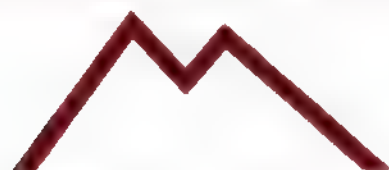
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GL	400 Accounts	800	1,600	7,000
AR	400 Customers	800	1,600	7,000
AP	400 Vendors	800	1,200	7,000
PR	400 Employees	—	—	—

SYSTEM REQUIREMENTS

Requires either CP/M® or MS-DOS (PC-DOS), MBASIC for CP/M®, BASIC for MS-DOS; 56K to 64K RAM; 2 Disk Drives or Hard Disk, at least 200K of mass storage (we recommend more); 132 column printer (an Epson MX-80 or similar printer with compressed mode is acceptable); call for exact requirements on specific systems.

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CIRCLE 432 ON READER SERVICE CARD

data will come from an existing file or from the keyboard (manually).

ENTERING
*data through the
keyboard is tricky,
because the program is
not very forgiving.*

Should you choose to download a file, its contents must satisfy Curvfit's strict requirements; your data must be listed as numbers alone without any guides.

Entering data through the keyboard is tricky, because the program is not very forgiving. If you discover an error in a figure after it has been entered, your only choices are to start all over again or forge somewhat mistakenly ahead; Curvfit provides no editing facility at this stage.

Considering that as many as 1,000

coordinates of three dimensions each may be entered, the chance of error looms large.

Displaying Calculations

After your final entry, Curvfit automatically calculates everything. If you've got a lot of data and you're looking for high order results, take a coffee break. Computations can take quite a while, 15 minutes or more for really heady stuff.

If you're reasonable in your demands, however, there's nothing to fear. My 20-point arrays took less than a minute, even up to eighth-order polynomials in 3 dimensions.

Next, the results—derived coefficients, maximum values, deviations, and the "fit" of the curve—are displayed.

At this point you are finally allowed to go to a menu from which you can display a graph of the results, edit your errors (at last!), change variables, or dump everything and retreat to PC-DOS.

Enhanced Mistakes

The menu's default, selection 0, will

execute if you happen to press the Enter key and nothing more. Unfortunately, this option returns you to the operating system, and everything you've done goes to the great data bank in the sky.

I found Curvfit tended to give up and dump back to the operating system all by itself. More than once the screen went from a graph straight to oblivion without passing the menu, possibly because an

CURVFIT
*tended to give up and
dump back to the
operating system all by
itself.*

inadvertent Enter command was floating somewhere around inside the computer, left over from the last command.

"Be careful," would be good advice to

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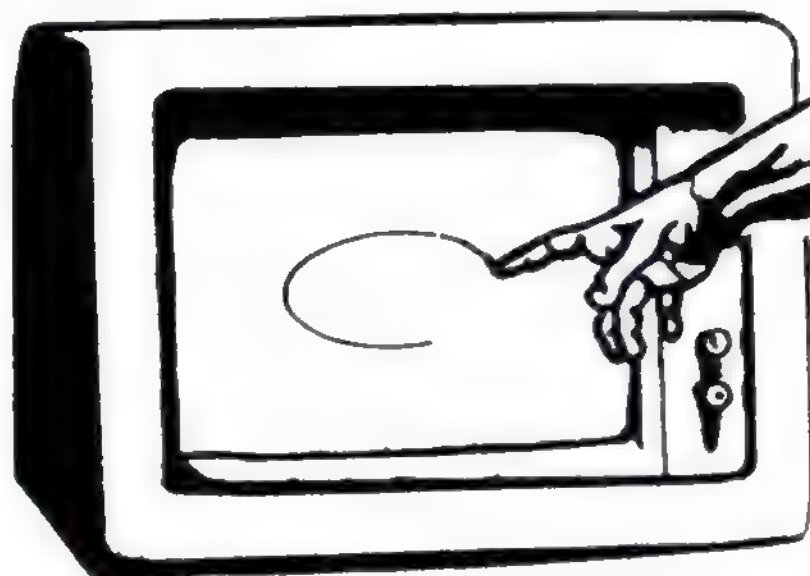
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CIRCLE 104 ON READER SERVICE CARD

users. "Change it," would be better advice to the author.

Note that although you can route your results to your printer when you pass the turnstile to get into Curvfit, the program has no screen dump. If you make a wrong choice when you start out, there's no going back; you'll have to recalculate everything, and maybe even reload.

Error messages don't abound, the advice is not particularly informative. For instance, when I tried to plot points I knew were on a sphere, Curvfit told me the solution was impossible but kept plotting in an effort to find it anyway. In my

mathematical naiveté, I might have thrown Curvfit a real curve accidentally, but I would have preferred to be told exactly what my transgression was and be warned that the resulting plot would be inaccurate.

THE PROGRAM'S flaws make for unexpected glitches.

Nevertheless, the plotted results help you visualize your data, whenever the program runs correctly. In 2-dimensional mode, Curvfit plots the data points and draws a smooth curve or a straight line, depending on the order of the polynomial. The graph is captioned with your previously chosen title, and the axes are labeled in exponential numbers corresponding to your data.

Three-dimensional data is plotted as a "fish-net" surface without labeled axes.

Without trying, I got Curvfit to crash at

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A ROUGH

*tool sometimes is worse
than no tool at all,
especially to a novice.*

this point, with a continuous scroll of "Memory Overflow. Value is larger than can be stored in memory. Try again."

The only recourse I found was booting up again; after that, every last keystroke of the 40 points I had entered was, of course, gone. It would be nice to be told what to do—and even better if crashes like this did not happen.

In summation, then, Curvfit isn't terribly hard to learn or use, but the program's flaws make for unexpected glitches.

The program does follow through on promises of its capabilities. If your work requires a substantial amount of analysis, Curvfit may prove useful.

It's also nice to be able to call the author on the phone to try to work out problems, rather than dialing up some reluctant corporate software supplier. "Talk to your dealer," is never a satisfying answer, particularly when your dealer in turn recommends calling the software company directly.

Curvfit 3-D is the first of a series of programs, promises Herkommer. However, if they're as rough as Curvfit when they're released, his promise may be a threat. A rough tool sometimes is worse than no tool at all, especially to a novice.

Polishing up the present product should be a better priority. A little work could make Curvfit 3-D much more useful, or at least less forbidding. /PC

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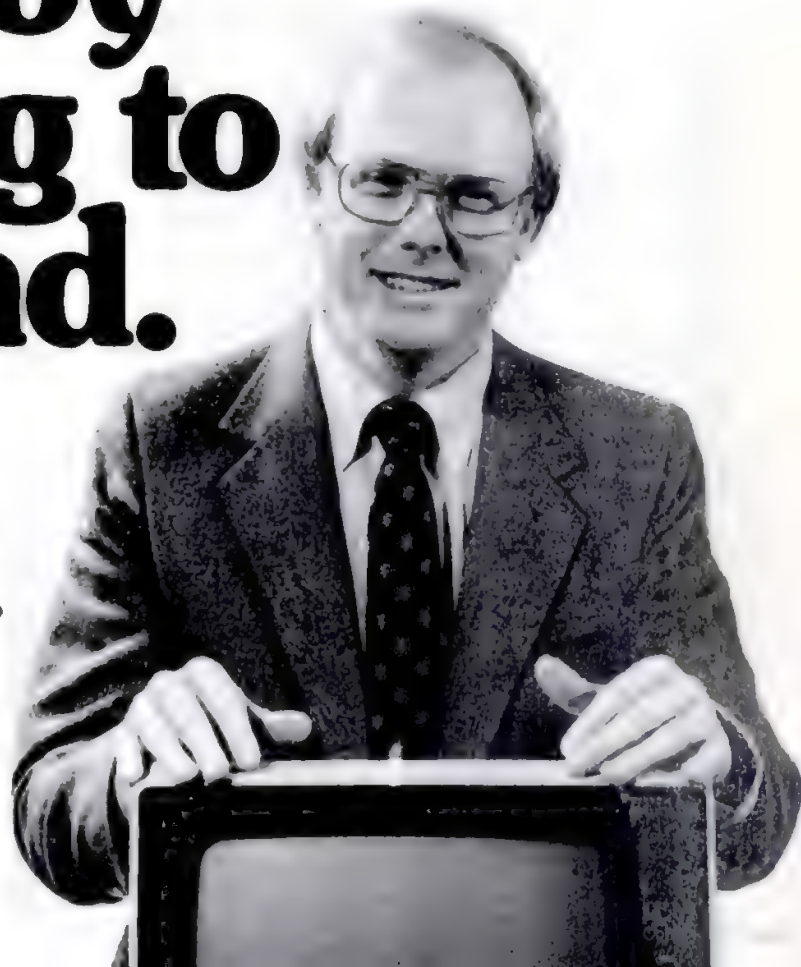
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IF YOU'RE CONFUSED PERSONAL COMPUTER,

At this moment, there are no less than 50 personal computers on the market. And more are being introduced every day.

On one hand, having all those options is a good thing. On the other, it can make picking the right one pretty difficult.



*Computers come in two parts.
You have to buy both.*

We'd like to help. So here are a few suggestions about how to buy the computer that's right for you.

Computers come in two parts.

One part is the "hardware," which is the machinery itself. The other is the "software," or a program, as it's sometimes called.

Software is the part that tells the computer what to do, the way a driver tells a car what to do.

Without software, a computer can't do anything.

And vice versa.

You have to buy both.

Buy the software first.

Since the reason you're buying a computer is to get the capability the software gives you (remember, it's the software that knows how to get things done), it makes good sense to pick the software first.

Start by making a list of the things you want to use the computer for. It can include almost anything—any kind of inventory, filing, accounting, graphics, reporting, record-keeping, analysis—you name it and there's probably a software program that does it.

Next, take the list into a computer store and ask the salesperson to give you a demonstration of the program, or programs, that will do the things you want.

Even though you'll need a computer for the software demonstration,

keep in mind the computer is just a vehicle. The software is the driver. And once you've decided on the software, picking out the rest of the computer system will be much easier.

The simpler the better.

Look for software that's easy to learn, easy to use, and that does the job in the simplest way possible.

Good personal software should be, as the computer people say, "friendly." Meaning that it helps you do what you have to do without getting in the way.



Meaning there are no complicated routines to follow to perform a simple task. And no programming language to learn.

Some people, however, will tell you that software has to be complicated to be powerful.

Nothing could be farther from the truth.

Because in order for a program to appear simple to you on the outside, it has to be extremely complex on the inside.

ABOUT BUYING A HERE'S SOME HELP

Good software keeps the complications in the computer, where they belong. And keeps the capability at your fingertips. It's that simple.

You simply have to see for yourself.

You can read any number of interesting books and magazines about personal computers. You can ask friends who have them. You can look at all the sales literature you can get your hands on. And you should do all those things before you decide to buy.

But as helpful as all that can be, there really is no substitute for a real, live demonstration.

When you do go out shopping, we recommend you take a look at the PFS® Family of Software.

The PFS family is designed the way we think all software should be: simple, straightforward and powerful.

Currently, three products make up the family: PFS:FILE, PFS:REPORT and PFS:GRAPH, with more programs on the way. Here's a little more about each of them.

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Basically, FILE works like a paper filing system, without the paper. So you can record, file, retrieve and review information in a fraction of the time it takes with a conventional filing system.

FILE lets you arrange your information in "forms" you design yourself. So you can get at and really use your information in ways never before possible.

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PFS:REPORT. Making the most of your information.

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GRAPH gives you presentation quality bar charts, line graphs, and pie charts, in black and white or color, on paper or the computer screen. To get a clearer picture of things and spot trends instantly, you simply enter your information and specify the kind of graph or chart you want. GRAPH does the rest.

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FILE DEFINITION

FUNCTION: File Definition Entry

Record Type: 177 Records Records For Disk: 1707

Field Name	Length	Position	Format
NAME	30	1	A
ADDRESS 1	30	31	A
ADDRESS 2	30	61	A
CITY	20	91	A
STATE	2	111	A
ZIP CODE	5	113	A
RECEIVING PHYSICIAN	25	118	A
AGE	2	143	A
DATE BORN	8	145	DDMMYY
DATE OF LAST ILLNESS	8	153	DDMMYY
ALLERGY 1	15	161	A
ALLERGY 2	15	176	A
ALLERGY 3	15	191	A

ADD Lines: 0 DEL Lines: 0 Save: 0

FILE DEFINITION

FAST SELECTION

FUNCTION: Selection Entry

No. of active records: 0

Select Field No. 1: 100

Select Field Letter: 1

Select Selection Type: 1

Field Name	Length	Position	Format
NAME	30	1	A
ADDRESS 1	30	31	A
ADDRESS 2	30	61	A
CITY	20	91	A
STATE	2	111	A
ZIP CODE	5	113	A
RECEIVING PHYSICIAN	25	118	A
AGE	2	143	A
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DATE OF LAST ILLNESS	8	153	DDMMYY
ALLERGY 1	15	161	A
ALLERGY 2	15	176	A
ALLERGY 3	15	191	A

FAST SELECTION

CUSTOM MAILING LABELS

FUNCTION: Add Customizing

Field Name Length Position Format

Field Name	Length	Position	Format
NAME	30	1	A
ADDRESS 1	30	31	A
ADDRESS 2	30	61	A
CITY	20	91	A
STATE	2	111	A
ZIP CODE	5	113	A
RECEIVING PHYSICIAN	25	118	A
AGE	2	143	A
DATE BORN	8	145	DDMMYY
DATE OF LAST ILLNESS	8	153	DDMMYY
ALLERGY 1	15	161	A
ALLERGY 2	15	176	A
ALLERGY 3	15	191	A

Field No. 1: 100

Field Letter: 1

Field Selection Type: 1

CUSTOM MAILING LABELS

FAST SORT

FUNCTION: Selection Entry

No. of active records: 0

Select Field No. 1: 100

Select Field Letter: 1

Select Selection Type: 1

Field Name	Length	Position	Format
NAME	30	1	A
ADDRESS 1	30	31	A
ADDRESS 2	30	61	A
CITY	20	91	A
STATE	2	111	A
ZIP CODE	5	113	A
RECEIVING PHYSICIAN	25	118	A
AGE	2	143	A
DATE BORN	8	145	DDMMYY
DATE OF LAST ILLNESS	8	153	DDMMYY
ALLERGY 1	15	161	A
ALLERGY 2	15	176	A
ALLERGY 3	15	191	A

FAST SORT

FILE MAINTENANCE

FUNCTION: File Maintenance Entry

Record Number: 1

Field Name	Length	Position	Format
NAME	30	1	A
ADDRESS 1	30	31	A
ADDRESS 2	30	61	A
CITY	20	91	A
STATE	2	111	A
ZIP CODE	5	113	A
RECEIVING PHYSICIAN	25	118	A
AGE	2	143	A
DATE BORN	8	145	DDMMYY
DATE OF LAST ILLNESS	8	153	DDMMYY
ALLERGY 1	15	161	A
ALLERGY 2	15	176	A
ALLERGY 3	15	191	A

Field No. 1: 100

Field Letter: 1

Field Selection Type: 1

FILE MAINTENANCE

SYSTEM MENU

FUNCTION: System Menu Entry

Record Number: 1

Field Name	Length	Position	Format
NAME	30	1	A
ADDRESS 1	30	31	A
ADDRESS 2	30	61	A
CITY	20	91	A
STATE	2	111	A
ZIP CODE	5	113	A
RECEIVING PHYSICIAN	25	118	A
AGE	2	143	A
DATE BORN	8	145	DDMMYY
DATE OF LAST ILLNESS	8	153	DDMMYY
ALLERGY 1	15	161	A
ALLERGY 2	15	176	A
ALLERGY 3	15	191	A

Field No. 1: 100

Field Letter: 1

Field Selection Type: 1

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TextPlus

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Requires: 128K RAM (64K version also available), one disk drive (two recommended), 80-column monitor.

CIRCLE 599 ON READER SERVICE CARD

Times are changing. It used to be that the introduction of a new word processor was big news. Now, word processors are a dime a dozen. It's practically the same story with spreadsheets, databases, mailing lists, graphic plotters, and other software packages. With the exponential explosion in the number of small computer owners in the country, more inexperienced computer users are facing the task of selecting programs among the many different varieties of software and then trying to use them. Experienced users are tired of switching disks and often reentering information when changing from one vendor's database to another vendor's word processor. The cry being heard now is, "Give us a package that will do it all in one program!"

Owl Software is one of the few companies that has taken a step toward giving

the consumer an easy-to-use integrated software package. TextPlus combines a word processor with a database to produce a package capable of handling many different applications. Also, the program includes other options, like bar plots, print spooling, and calculator features. And unlike many "combo" packages that

TEXTPLUS
*combines a word
processor with a
database.*

cost close to half the price of most microcomputers, TextPlus gives you all of its text/data power for only \$240. TextPlus does not include communications, spreadsheets, or graphics features like some of the others, but if a word processor and a database are all you need, it will be hard to find another package that beats its performance for the price.

Requirements

The minimum system required to run the 128K version of TextPlus includes a

PC, one disk drive, an 80-column monitor, and PC-DOS. If you have only one 160K drive, you will have to switch disks when going from a text file to a data file. The TextPlus system is made up of three major programs, and quite a few small data files are used for Help prompts and other system functions. To use a 160K disk drive, the data program and the text program have to be split on separate disks, since they are too big to reside on the same 160K disk. If you have one 320K drive, you could store all the programs on one disk, but there would be little room for text and data files. The best solution is to have two disk drives, one for the programs and the other for file storage.

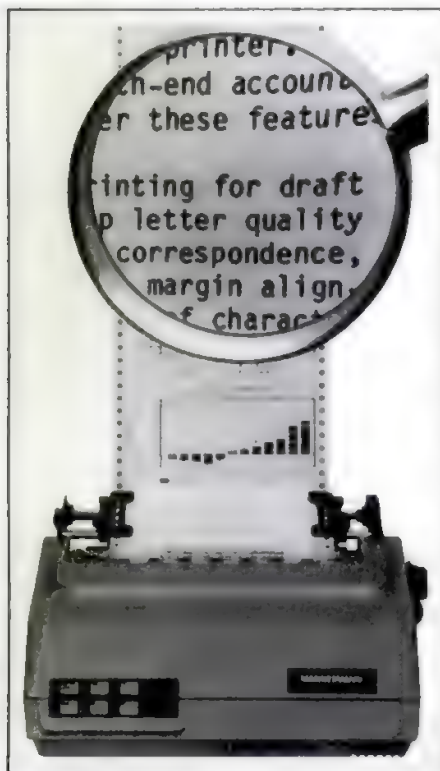
One last requirement is 64K or 128K RAM; versions of TextPlus are available for both capacities.

The 128K TextPlus is a compiled version offering faster response time, larger file capabilities, and some additional features not found in the 64K version. I used the 128K version for this review. If you have more than 128K of RAM, you can use it with the program's print spooler, which allows you to set up any amount of RAM to be used as a print buffer. I set up about 32K of my system's 256K as a print buffer. I found that I only had to wait about 3 seconds after issuing the print command before TextPlus was free to do something

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CIRCLE 303 ON READER SERVICE CARD

else while my report was being printed.

Owl Software's package will support a hard disk if you have one. The system is initially set up to handle either an Epson, an IBM, or a C.Itoh correspondence-quality printer, but its "printer types" file allows it to be configured to just about any printer. I configured my C.Itoh dot matrix printer with TextPlus and could produce 10, 12, or 17 character-per-inch (cpi) text or proportional print in any combination of normal, expanded, and bold types. The IBM monochrome display is the default terminal, but two- or multicolor terminals can also be selected. The system will support a two-bin sheet feeder.

Applications

The combination of a word processor and a database provides so many application options that I could not possibly list them all. However, the options displayed (see Figure 1) when the Create option is chosen from the TextPlus main menu will

**MORE THAN
128K of RAM allows
you to set up a print
buffer.**

give you some idea of possible applications. As you can see, many options are already set up for you. If your application does not correspond to any of the first 11 options, then you can set up your own specified file with option 12. Option 11 is for editing and creating program files in BASIC, Pascal, or assembly language. (I tried using it to edit a FORTRAN file that

Figure 1: Menu of Create options.

- 1 - TEXT FILE
- 2 - BUSINESS LETTER
- 3 - MERGED TEXT AND DATA LETTER
- 4 - DATA FILE
- 5 - TELEPHONE LIST
- 6 - MAILING LABELS (3 LINES MAX.)
- 7 - MAILING LABELS (4 LINES MAX.)
- 8 - MAILING LABELS (5 LINES MAX.)
- 9 - TABULAR FILE
- 10 - PLOT FILE
- 11 - PROGRAM
- 12 - USER SPECIFIED

was created with the PC-DOS EDLIN, but I could not get my changes to work.) Text File and Data File, options 1 and 4 respectively, are straightforward applications of word processing and database management functions. The other options are variations of each or combinations of both.

Overview of Options

The main menu, displayed when you first enter the program, is shown in Figure 2. Most of your time will be spent in option 4, Change/View File, which edits both text and data files. To start, create a new file (option 3) or read an existing file from disk for editing (option 1). Option 9 from the main menu lists a directory of what is on any drive. The Help option displays several screens of useful information on any aspect of TextPlus. There are other Help screens available when you are editing files. (I will cover options 5 through 8 and 11 through 13 later in more detail.)

The last choice is Program Selection, which loads one of the three major pro-

Figure 2: Main menu for TextPlus

- | | |
|-----------------------|--|
| 1 - READ FROM DISK | 7 - PRINT MAILING LABELS |
| 2 - SAVE ON DISK | 8 - PRINT PLOT |
| 3 - CREATE A NEW FILE | 9 - DISK DIRECTORY |
| 4 - CHANGE/VIEW FILE | 10 - HELP |
| 5 - DISPLAY | 11 - MERGE/SPLIT DATA FILE(S) |
| 6 - PRINT | 12 - SELECT PARTS OF FILE(S) FROM DISK |
| | 13 - SORT |
| | 14 - PROGRAM SELECTION |

"No, we're all okay, but our computer's gone."

It could have been a lot worse.

Luckily, all that was missing was the computer and some spreadsheet software. And that should be covered by insurance.

But it isn't. Ed didn't realize that once he started using his home computer on business projects, his homeowners insurance no longer would cover it.

As suddenly as the robbery had occurred, Ed found himself out several thousand dollars with no way to recover it.

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grams into memory or lets you exit Text-Plus. To accommodate single-density disk drives, Owl Software divides its system into three parts: the Text program, the

I F YOU WANT to work on a business letter, load the Text program.

Data program, and the Select program. Depending on what kind of file you want to work on or what you intend to do with it, you have to select one of these three programs. If you want to work on a business letter, load the Text program. If you want to work on a telephone list, load Data. The Select program is used when you want to sort data files or select specific records or fields from an existing database. Be sure to load the correct program

first before reading the file from the disk for editing. For example, I was in the Text program when I read a data file from disk. When I tried to update the data file using option 4, the Data program loaded automatically, but the data file that I had previously read was erased from RAM; I had to read the data into memory again. The correct procedure is to select the program first, then read the file to be changed.

Text File Capabilities

TextPlus provides most of the features included in popular word processors available today. The maximum text record length is 79 characters. The maximum text file is 33,000 bytes on a system with 128K RAM, and 46,000 bytes with 192K RAM. All the standard commands are included: word wrap, headers and footers, right margin justification, centering, underlining, moving, copying, searching, automatic replacing, merging, left/right page numbering, and splitting the current file into two files. Despite the number of commands, deficiencies in the way TextPlus

displays the text being edited and the awkwardness of some commands keep the package from being competitive with stand-alone word processors.

There are two basic ways to edit and format text files: either through commands using the PC function keys or with what Owl Software calls "imbedded commands." Most of the actual editing is done with the function keys. I consider this a definite advantage. Word processors

MOST EDITING is done with the function keys.

should limit as many commands as possible to a single keystroke. The possible commands are displayed on line 25 of the screen. Since there are more than ten editing commands, pressing F2 selects and

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displays a different set of edit commands with changes in the meaning of five function keys (see Figure 3). Also, when you wish to enter or exit the block insert mode, the BLKINS command (F1) changes to ENDINS.

Most of the commands work similarly to commands in other word processors. A couple of them need some explaining. SETL allows you to go to any line in the document. Unfortunately, you cannot jump to any particular page number, only line numbers. This means you have to keep track of which lines are on which page. Most word processors continually display the current character position, line number, and page number; TextPlus does not. ADD allows you to enter lines of text at the end of the file. You can split the file being edited into two files using the SPL command. SKIPW moves the cursor from the beginning of one word to the

Figure 3: Function key commands. The alternate set is selected by pressing F2.

Initial Function Key Commands	
F1=BLKINS (Block Insert)	F6=SETL (Set Line)
F2=FKEY (Change Function Keys)	F7=SRCH (Search)
F3=MOVE (Move Text)	F8=HELP (Help)
F4=DEL (Delete)	F9=SKIPW (Skip Word)
F5=ADD (Add Lines to End)	F10=DW (Delete Word)
Alternate Function Key Commands	
F1=BLKINS	F6=MERG (Merge File)
F2=FKEY	F7=REPL (ReplaceString)
F3=SPL (Split file)	F8=FRMT (Format)
F4=DEL	F9=SKIPW
F5=COPY (Copy Text)	F10=DW (Delete Word)

ul=word
underlined.

At print time, these three lines will appear this way:

This is a line with a word underlined.

The way the underline command appears on the screen does not represent the text as it will be printed. This applies to the other

imbedded commands as well. I look forward to the day that a microcomputer word processor will display the text on the screen exactly as it will be printed, complete with underlining, boldface, and so forth.

One of the nice features of TextPlus is its ability to easily merge database information (like names and addresses) into a text file for generating a mass mailing. Another asset is the ability to create card

WORD

processors should limit as many commands as possible to a single keystroke.

next. However, one disadvantage is that TextPlus does not continually reformat the display after deletions and insertions. If you want to reformat the screen after some changes, you have to enter the FRMT command. This executes in about 3 to 4 seconds for a short file and can run as long as 20 seconds for a large file—very annoying to anyone who hates waiting.

Imbedded commands are used for text formatting. Some of these are placed at the beginning of the text while others are placed throughout the text where needed. These commands set up the margins, word wrap, character print styles, justification, headers and footers, centering, line spacing (1, 2, or 3 lines), page breaks, tabs, and underlining. The underlining procedure is very cumbersome. If you wanted to produce a sentence with a word underlined in the middle, you would have to enter three lines in this fashion:

This is a line with a

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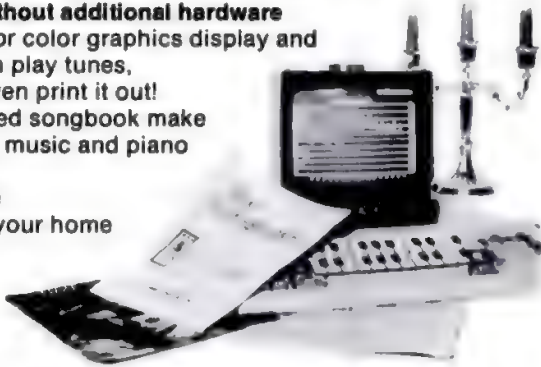
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Figure 4: Menu of function keys in Change/View File mode.

F1 - ADD NEW RECORDS
F2 - CHANGE/VIEW RECORDS

F3 - DEFINE A NEW FIELD
F4 - ADD NEW FILE COMMANDS
F5 - CHANGE/VIEW FILE COMMANDS

ESC- RETURN TO MAIN MENU

PRESS FUNCTION KEY OF YOUR CHOICE

files of miscellaneous information. By using option 12. Select Parts Of File(s) From Disk, you can get a new file that contains all occurrences of certain strings or groups of strings found in the main file. For example, you could extract all the paragraphs from your "card file" in which the phrase "word processor" appeared. Then all paragraphs containing this phrase would be grouped in a new file of information about word processors.

Data File Capabilities

The maximum data record length is

253 bytes, with a maximum field size of 72 bytes (21 fields per record is the maximum). The maximum data file size is 37,000 bytes with 128K RAM, and 41,000 bytes for 192K RAM. You can have only up to 1,000 records per data file no matter how much RAM is in the PC. This can be a problem for anyone who wants to create large databases, but for most people the 1,000-record limit should be adequate.

TextPlus has all the usual database commands that allow you to work with data files. When creating a database, you are asked to select the title for each new

field, as well as how many characters will be allowed in the field (the length can also be variable). The program will ask you if the record information is numeric or alphanumeric. Then you can define more

THE DATABASE commands make it very easy to browse through the data records.

fields or start entering records. When you change the database, the menu shown in Figure 4 is displayed. The functions of all of these commands are obvious, except for the last two. These allow you to add or change data file commands similar to the imbedded commands in text files. With the data file commands, you can set the number of spaces between columns, number of sets of records per line, spaces between records, and page titles. The database commands make it very easy to browse through the data records both forward and backward, starting from any selected record.

Once you have set up a database, option 13 (Sort) from the main menu makes it easy to sort information by any field(s). Selecting certain fields or certain records from an old file or group of files can be accomplished easily with the same Select option that was used to pick paragraphs from card files of text. Option 11, Merge/Split Data Files(s), takes two data files and merges them or splits one file into two or more.

Report Generation

Options 5 through 8 on the main menu give you four ways to produce a report from your text or database file. Display (option 5) takes your report and displays it in finished form on the screen so that you can see how it will look before printing. The only drawback applies to files containing compressed text (like 17 cpi) that results in more than 80 columns of characters. Each printed line will be shown as two lines since the monitor can display only 80 columns at most. In addition, not

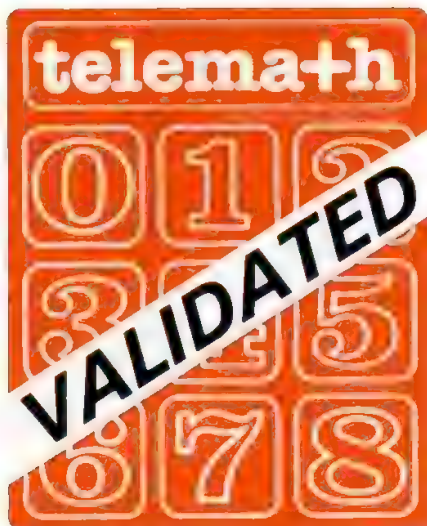
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all of the different typestyles can be displayed correctly, though proper underlining is shown.

The Print option can print your data or text file. With both the Display and Print options, you can choose to output multiple files. From the Change/View mode, an

the appropriate imbedded command in the tabular data file or merged text file.

TextPlus provides an easy way to print 3-, 4-, and 5-line labels for mass mailings. The 5-line label will look like this:

FIRST NAME(S) LAST NAME
TITLE OR DEPARTMENT
COMPANY
STREET ADDRESS
CITY AND STATE ZIP CODE

The label output is restricted to one column per page, which is a limitation I feel Owl Software should remove.

The last print option is Print Plot; this takes the information in a database file and produces a histogram plot. You are prompted for xmin, xmax, and xstep when you first create a plot file; these variables set up the size and increments of the plot. You also set up the vertical and horizontal titles for the x-axis and y-axis with imbedded commands. The histogram shown in Figure 5 was producing using Print Plot.

Manual and Ease of Use

The manual comes in a nice-looking brown notebook about the size of the IBM manuals. It is divided into six chapters

You CAN have data printed in tabular form.

imbedded command can cause the file to be copied into a disk file instead of through the printer. When you print a data file, you can select to have that data printed in tabular form, with optional average and percent columns automatically added. You can also choose to have totals and subtotals for selected columns. At print time, merging data from an existing file or from the keyboard into a text file, such as a business letter, is possible. You have to select this option beforehand by including

Figure 5: Histogram for sales of three products over a nine-month period.

unit sales quantities (in 1000's)

	I	9		
	I	9	B	
	I	9	89	8
200	I	9	89	78
	I	9	59	678
	I	89	59	6789
	I	89	789	56789
	I	89	789	56789
150	I	89	789	56789
	I	89	6789	56789
	I	89	6789	56789
	I	89	56789	456789
	I	89	56789	456789
100	I	6789	56789	3456789
	I	6789	456789	3456789
	I	6789	456789	23456789
	I	56789	3456789	123456789
	I	456789	123456789	123456789
50	I	123456789	123456789	123456789
	I			
	a		b	c

First nine months of 1983

and a brief introduction. The first chapter explains how to get your disks in order and configure TextPlus to your monitor and printer. These instructions are clear and concise. The next section is a quick overview of the system to get you started and oriented with the different commands. The third chapter describes how to use the Change/View option (once you start using the program this is where you will spend most of your time), while the fourth describes the rest of the commands. I would have liked more examples in these last two chapters.

Examples of about 15 different applications are covered in the fifth section. Owl Software even includes several example files on a disk that takes you through these examples, along with a start-up file with examples that introduce you to the entire package. This start-up file is set up so as not to allow you to make a wrong entry; only correct responses are accepted by the system. I thought this was an excellent training aide for new owners.

The last chapter is a complete list of possible error messages with their descriptions and what to do when they occur. This is probably the best job I have seen from a software vendor regarding error explanations. I applaud Owl Software for doing what all vendors should be doing anyway—especially as they sell products to more and more inexperienced computer users.

The system is easy to use. Most com-

this saves considerable time. I did not have any system problems in which TextPlus did something it should not have. It

***T**HE PROGRAM has been well tested for bugs.*

appears that the program has been well tested for bugs.

Pluses and Minuses

The big advantage to TextPlus (and other combination software packages) is its ability to work with both text and data in a single program and avoid switching disks and copy files back and forth to accomplish the same results. Owl Software has designed and marketed a system that does this very well. The package includes many features that make it attractive: histogram plotting, printer spooling, sorting, easy printer and terminal configuring, and the data/text Select capability.

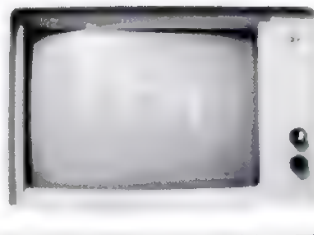
I believe that incorporating a better word processor program, the text displays of which look more like the printed format, would make TextPlus a better combination package. More output format commands for data files and a larger number of records allowed per file would improve the package even more; the ability to handle more than 80 columns on the screen would also be nice.

TextPlus does not give you a word processor or database that is comparable with the leading specialized programs in these fields. It lacks the versatility and "polish" that the leaders have. However, Owl Software's package does provide a good word processor and a good database that can easily handle most applications. Some of the commands are awkward to use, but this is a limitation you can live with. Most of the combination packages offered by other vendors suffer from the same problem: jack of all trades but master of none. Overall, I doubt that any other available package that combines the same set of applications programs could have a better price/performance ratio. I would say that anyone who invests in Owl Software's TextPlus has made a wise decision. /PC

***P** RINT PLOT
takes the information in
a database file and
produces a histogram
plot.*

mands are entered by pressing a function key. There are a couple instances where you have to wait several seconds while the system is busy doing something, like reformatting the text files. You also have to wait about 8 seconds while the system loads one of its three main program blocks. TextPlus does include a print spooler option that allows you to set up any amount of RAM for a printer buffer;

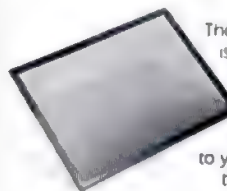
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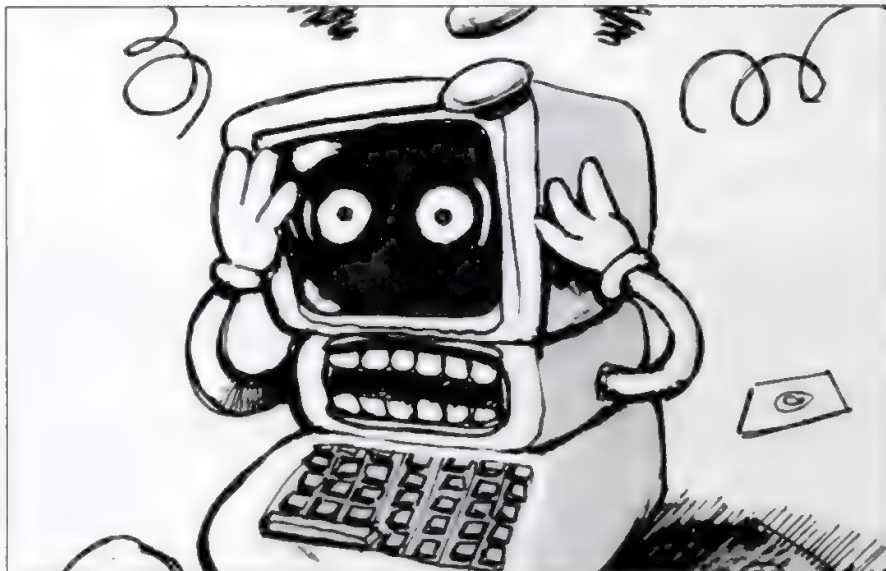
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DATAFAX
*comes very close to the
sort of unstructured
tabula rasa database
I've been looking for.*

database. Sure, there are the DBase IIs and the Condors and other very capable database managers. And there are the VisiDexes, the Desktop Organizers, and the

Cardboxes. But these all require the user to have a strong system of organization already in place. These work fine for those with a native sense of organization, but like many writers, I require a considerable amount of "creative clutter" and disorganization to keep the juices flowing.

Help at Last

Enter DataFax. This keyword data base program, though not perfect, comes very close to the sort of unstructured tabula rasa database I've been looking for. I just might uncover the top of my desk sometime this year.

With this program, I can maintain

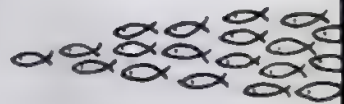
records of telephone calls, letters, appointments, assignments, money owed, money paid—in other words, the sort of information now stored on scraps of paper on my desk. The DataFax is capable of keeping track of more structured information, as well. A printing format control allows you to maintain a mailing list with additional (unprinted) information on accounts. The DataFax sort commands allow information to be ordered by alphabet, assigned numerical order, date of entry, specific subject, or any other scheme you might devise. An obvious use for this free-form program is preparation of catalogs.

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CIRCLE 227 ON READER SERVICE CARD

PC MAGAZINE 379 APRIL 1983

DataFax allows you to create as many as 3000 electronic "folders" of your own design in a particular database. The number of folders is limited by the amount of disk space available and the length of each entry. Each of the folders may have as many as 255 pages of information, with up to 60 labels or keywords assigned.

Quite simply, DataFax presents you with a blank screen on which to type—no forms to fill out, no significant strictures on the sort of information you may place on the screen. You can mark any word or number on the screen for indexing or cross-referencing. You can even add words to the index that do not appear on the file but might otherwise be of assistance to you in a search. There is also an Autokey command that automatically labels each file folder with a particular set of keywords.

Searching

DataFax allows you to search through files in two ways: Examine and Scan. Scan lists the file folder names of all documents that meet the criteria of the search. Examine produces the full folder or folders.

Suppose you have a DataFax database consisting of several hundred folders of information about your favorite restaurants. The simplest kind of search involves a single key. Enter "Chinese" and hit Return twice, and the program will either list the names of all folders that include that keyword (if you are using the

make further distinctions among identified sets. Using the restaurant database again, you could search for "Chinese AND Manhattan" to find an oriental eatery in a particular place or "Italian AND Portland AND Parking AND Credit Cards" if you wanted to drive your car to Oregon for a pizza and leave your cash at home. Similarly, if you're not overly particular, you could ask for "French OR Swiss."

The flexibility of DataFax allows you even greater precision when searching files. You could ask for "German OR French AND Chicago OR Duluth." In this case, the parsing of the database syntax might give you more (or less) than you want. What this command would yield would be Chicago's German or French restaurants and every file (regardless of subject) on Duluth. In order to regain logical control, you have to add parentheses, just as in mathematics. Try: (German OR French) AND (Chicago OR Duluth).

The program includes a Sort command that allows you to order folders specified by alphabetical or numerical criteria. DataFax, however, sorts numbers from left to right, which could cause a problem. For example, a sequence of numbers beginning with 298 and ending with 297985 would be generated in the following order: 2978, 29784, 2979, 297985, 298, 2981.

Operation

DataFax is written in UCSD Pascal and runs under the p-System operating system. Run-time modules of both are provided with the package when purchased. This choice of languages presents both advantages and disadvantages. The p-System is supposed to allow for "transportability" from one computer to another; however, unless your other files (including word processors, spreadsheets, and other databases) are prepared with the same operating system, you will have to "translate" each file from one operating system to the other. DataFax includes a translation utility. The instructions, though, are vague at best. I was unable to make the translation program work until I called Link Systems for assistance. I did receive a courteous response from the woman in the technical division. She answered my call, and volunteered an admission that she was not familiar with the requirements of IBM DOS.

Until Link Systems improves the translation utility and the appropriate section of the manual, I would hesitate to recommend the program to people who need to run DOS files under DataFax.

With the exception of the translation features, the DataFax manual, presented in a padded binder with slipcase, is competent and comprehensive. It includes a useful index and table of contents, a reference-glossary, and a section on advanced techniques. A useful conversational tutorial walks the first-time user through steps of the program. The text in the manual, regrettably, was prepared on a dot-matrix printer, an economy that does not seem

DATAFAX
*allows you to create as
many as 3000 electronic
"folders."*

Scan command) or display the full contents of each folder that meets this criterion (in the Examine mode).

You can also search using a wild card, specified by using a trailing equal sign (=) character. If you were to ask for Ch=, you might be pointed to folders on Chinese restaurants, chicken houses, and cheese stores.

DataFax can initiate a search using the Boolean logical operators, AND/OR, to

DATAFAX
*is written in UCSD
Pascal and runs under
the p-System operating
system.*

appropriate in an otherwise class act.

Starting from Scratch

The manual presents a clear explanation, spiced with a bit of humor, on the process of booting up the program disk. A minor complaint: it consistently refers to the disk drives as "1" and "2" rather than A and B as PC-DOS users are accustomed to. The program disk is not copy-protected and you may make backup copies for your own use. The system must be loaded with a Ctrl-Alt-Del reset or from a p-System prompt if you are already working with that system. It cannot be loaded from the A>DOS prompt. The system produces a series of beeps and disk drive whirs with a very different cadence and sound from that of a DOS disk. I kept fearing the PC was undergoing a mechanical crisis during the 50 seconds it took to load my machine.

In any case, the program does load, presenting the following opening menu:

```
S{etup a new data base
O{pen an existing data base
B{ack up a diskette
F{ormat or erase diskette
```


C{onfigure system
T{ranslate text files

DataFax can format a new database disk without exiting to the operating sys-

DATAFAX *can format a new database disk without exiting to the operating system.*

tem. This is an important feature, since the program assumes a nonstandard (for PC-DOS) format of ten sectors per track instead of eight. It allows an override if desired. The copy command includes an automatic verification of the copy as well.

The next step for the start of operations is the "Configure" menu. DataFax will read the switch settings on your PC and automatically insert the memory of your machine in the default settings of the program. DataFax cannot use more than 128K. If your system has more memory than required, you might consider using an electronic RAM disk that can operate

under p-System.

After you have set up your database, you can begin creating folders. The opening screen displays a single line of text on it:

```
DataFax(2.4) New Exam Scan Print  
Delete Keys AutoKeys File Load  
Unload Quit
```

Typing N for "new" creates a folder. The command line at the top disappears and is replaced with an editor line at the bottom, which tells you:

```
[Editor: Page 1 of 1 Created:  
unsaved  
Updated: never Keys: none]
```

The cursor appears at the top left of the page, and you are free to type anything you wish onto the screen. DataFax includes a competent editor (see Figure 1). If the programmed editing functions don't suit you, you can redefine all of them, plus a few more, from a DataFax menu.

There are three ways to identify keywords for the program. One allows you to mark them as you write. Just type the Ctrl X combination when the cursor is in the space to the right of whatever word you wish to add to the list. The second alternative allows you to go back into a document and type Ctrl X anywhere on the screen. The third way to identify a keyword is by typing Ctrl K at any time during editing. The screen is replaced by an

THERE
*are three ways to
identify keywords for
the program.*

alphabetized list of current keywords. You are able to add or delete keywords directly—and you may convert any word or phrase not included in the document itself to a keyword.

All in all, DataFax is a not bad addition to your computer. With enough organizational resolve, it might help you sweep the papers off the desk top and into a disk where they belong. Rumor has it, by the way, that my desk top is brown... /PC

Figure 1: DataFax editing functions (as delivered)

Move cursor left	Left arrow
Move cursor right	Right arrow
Move cursor up	Up arrow
Move cursor down	Down arrow
Tab cursor	Ctrl I
Home cursor	Home
Tab to next word	Ctrl W
Insert character	Ins
Insert line	PgDn
Delete character	Del
Delete line	PgUp
Copy line buffer	Ctrl C
Erase line	Ctrl E
Erase screen	Ctrl R
Mark key	Ctrl X
Verify page	Ctrl V
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Cancel edit	Esc

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The PC won't save you from bad investments, but by providing market information quickly and assessing the big picture, it may help you save yourself.

Computerized Investing: Taking Stock of Your Securities

It's no longer unusual for more than 80 million shares of securities to trade hands each day on Wall Street. In this high velocity environment, seasoned investors keep a constant line of communication open to bankers and brokers, financial services, and economic forecasters. A flourishing spinoff industry publishes countless investment surveys and trading strategies.

Many individual traders, lacking either a library of research aids or a staff of clerks, make investment decisions based on speculation or intuition. Others take a more technical approach; relying on statistical analysis, they cull the financial pages for price quotes and volume fluctuations and turn newspaper summaries into elaborate algorithms or meticulous hand-drawn charts.

These techniques may work, but when you are tied to tedious numerical calculations and frequent phone calls to brokerage houses, the job of guiding your investments is bound to lose some of its appeal.

The marriage of microcomputers and investment software makes older methods

of portfolio management seem primitive by comparison. Although a computer cannot relieve an investor of the risk or effort involved, it can simplify the task and produce accurate and speedy results.

Bare-Bones Management

The simplest investment software may be nothing more than an accounting package. The selected equities are stored on a disk file, and as shares are added or sold, the program recalculates the current asset balance automatically. In addition, it usually figures percent or dollar tabulations for profit and loss results. A well-designed template on an electronic spreadsheet, however, could provide the same functions.

This type of bare-bones portfolio management is insufficient for most investors. More sophisticated investment software that can gain access to financial data banks through communication technology suits their needs better. With a modem, a microcomputer, and access software, a trader can receive the same mainframe data services available to investment firms





and financial institutions. Company profiles, corporate earnings, financial news, and market information can be obtained

**WITH A
modem, a
microcomputer, and
access software, a trader
can receive the same
mainframe data services
available to investment
firms and financial
institutions.**

over telephone lines. Quotes on common and preferred stocks, corporate and foreign bonds, mutual funds, options, and treasury issues are available during mar-

ket hours, usually with only a 15-minute delay. Portfolios are kept current by recording the day's closing quotes automatically and then calculating unrealized gains and losses.

More Sophisticated Software

Three more types of investment software currently on the market provide even more useful features. The first produces organized reports and presents the updated information in consistent, readable style. Its orderly documentation enables the user to see the transactions laid out neatly, resulting in wiser investment decisions.

A second type of investment software translates current and historical quotations into bar charts, graphs, and trend lines, making comparisons with other stocks and overall market performance. Such comparative charts based on common indicators are a necessary component of technical analysis.

Finally, the most complicated software package evaluates a portfolio by monitor-

ing the momentum of stocks or by using fundamental screening tests such as price/earnings ratios, dividends, past growth, book value, and risk potential. This program takes the task a step further and actually suggests investment strategy and timely buying or selling points.

A Broader Perspective

The ultimate purpose of portfolio mon-

**THE ULTIMATE
purpose of portfolio
monitoring programs is
to make the investor's
task more manageable.**

itoring programs is to make the investor's task more manageable and to help him trade in the market profitably. Though a

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**BY TAKING
over time-consuming
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investment software provides for account maintenance and order tracking. By simply scanning the printout, an investor can find the answers to many questions. What percentage of the investments represent high-risk or low yield stocks? Which pay steady dividends? What proportion is invested in energy, technology, or blue chips?

By taking over time-consuming calculations, a computer allows you to monitor many more securities than would otherwise be possible, thereby expanding your investment opportunities. You can make test sales and examine hunches on paper through trial extrapolation. Would you bother if it meant hours at the desk with a calculator and a columnar tablet?

Instant electronic access to news, facts, and financial data may even affect investment decisions. Keeping tuned to market moves is particularly important to short-term options traders and large-scale capital investors. Fortunes can rise and fall because of slight fluctuations in prices. Current information is vital for any investment concept such as puts and calls because the prices are highly dependent on the volatility of the market.

Computerized charting of the cyclical swings and price trends still leaves ultimate judgment to the person operating the

machine. But computer-aided graphic analysis allows you to visualize the momentum. Patterns and fluctuations are more obvious when price/volume averages are displayed dynamically. Trend lines tend to place the gamble in a more rational arena.

Objectivity

Finally, do not overlook the computer's objectivity and its patient, persistent perspective. It can't be swayed by the advice of a trusted friend or by a subconscious bias toward a particular choice. While emotions play an important role in our selections, the computer places all investment possibilities under its unbiased electronic scrutiny. By applying statistical analysis to the variable store of information, the computer maintains a stable, consistent perspective in the face of an erratic and risk-prone investment environment.

Software For Everyone

The type of software you choose really depends on your individual investment style. Traditional trader, statistical investor, impulsive high-roller: the computer performs for all. A technical evaluator will require file retrieval to examine historical quotes and quarterly earnings reports. The chart makers who plot trend indexes and performance averages need a program

**THE TYPE OF
software you choose
really depends on your
investment style.**

with graphics capability. Market analyzers and formula traders will benefit from software designed to analyze stocks and suggest strategies. Everyone has a system. Investment software can mitigate some of the market's mammoth complexity, and in one way or another, everyone's system can benefit. /PC

Ellen R. Wilson is an independent writer and a sales representative for Computer-Land of Marin in Novato, California.

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- Mannesmann Tally Printer
- Okidata Printer
- IDS Printer (please confirm model)

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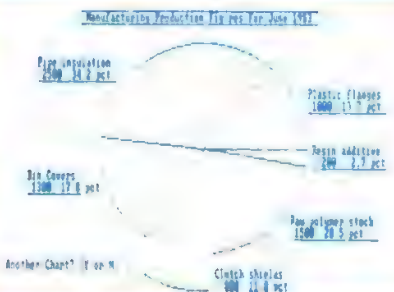
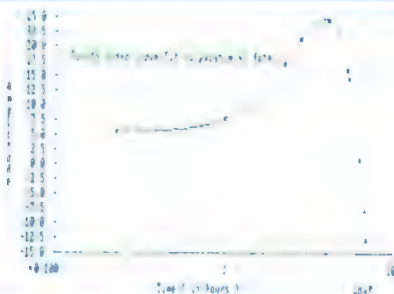
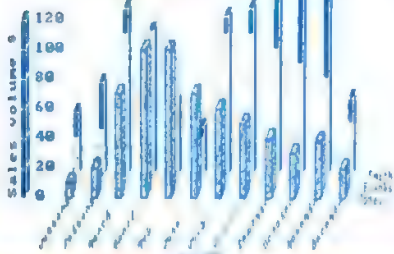
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Probing The Market With Investment Software

Since the advent of the PC, independent companies have flooded the market with various software packages that promise to make full use of the PC's capabilities, a promise most are unable to keep. The same is true of the latest wave of specialized programs to hit the PC market: investment software.

All of the investment software packages reviewed below eliminate time-consuming calculation and analysis and provide the basic information needed to make investment decisions. Yet each lacks the capabilities needed to encompass the full range of investment applications.

The Ideal Package

What features should a comprehensive software package include? First, it should provide more analysis of longitudinal data. It should track option and stock price movement over time and using this data, estimate the rate of likely future movement. Such a program should automatically retrieve data from a major financial service such as Dow Jones and keep an ongoing record. Finally, it should use the capabilities of the PC to present the data graphically in a way that would simplify analysis.

The Personal Investor
PBL Corp.
P.O. Box 559
Wayzata, MN 55391
(612) 471-7644
Source ID - TCT327

List Price: \$145

Requires: 128K, two disk drives, monochrome adapter or color graphics adapter. Modem and serial async card required for Dow Jones News/Retrieval.

CIRCLE 509 ON READER SERVICE CARD

Personal Investor is a capable portfolio manager. It can dial the Dow Jones News/Retrieval Service or other electronic news terminals, enter your private password, and automatically collect the most recent trading prices of the selected securities at the rate of ten items per minute. It then stores the information gathered for each security in the appropriate portfolio records.

Updated Version

Personal Investor has also been updated to resolve one of the drawbacks mentioned in an earlier review ("Life Among the Bulls and Bears," PC, Volume 1 Number 7). The automatic quote retrieval function, previously available only with common and preferred stocks, has been expanded to include bonds, mutual funds, options, and treasury bills. In addition, the updated version stores purchase records in a Data Interchange Format (DIF) file, allowing the ticker symbol, purchase date, share cost, number of shares purchased, current price, quarterly dividend, and ex-dividend date to be transferred to a VisiCalc program without the need to re-enter information. The new *Personal Investor* also requires two disk drives,

since a DIF file of all purchases is automatically written to Drive B. DIF files cannot be written to disks containing either the program or portfolio data.

The procedure for adding securities is handled in the same way as in the original version. First, however, you must indicate the type of security being entered. This procedure is accomplished in the Add/Change screen by pressing the F6 special function key. The types of securities are then displayed, and you type in the first letter of your selection: (S)tock, (O)ption, (B)ond, (M)utual Fund, or (T)reasury Bill. Instead of requesting a stock symbol, the new screen will display the type of security chosen and prompt for its trading symbol.

Selling Short

By manipulating existing field entries, you can sell stocks and options short. A short sale is added to and displayed with long stocks and is identified by entering S on the left side of the Number of Shares column in the Add/Change screen. It is sold on the purchase line and purchased on the sell line. Options are written (sold short) in the same manner. To let the program know you are entering a short, press the minus key (-) before entering the number of shares (or in the case of options, the number of contracts) sold.

This may sound confusing, but it really isn't. The *Personal Investor's* strength is its ease of use and the orderly reports it generates. As a portfolio manager, it

Figure 1: Print-outs of purchase records from Personal Investor

UNREALIZED GAIN / <LOSS>						
Today's Date 12/1/82			Last Updated 11/29/82			
Symbol	Description	S L	Purchase Cost	Current Value	Short Term Gain / <Loss>	Long Term
IBM	Intl Bus. Machines		1792.00	2422.00		630.00
ASTR	Astrosystems		467.63	946.13	478.50	
NOM	Natomas Corp		508.25	313.50	<194.75>	
OXY	Occidental Petroleum		500.00	367.50	<132.50>	
TNDM	Tandem Computer		3887.81	5670.00	1782.19	
DYSN	Dysan Corporation		1737.50	1975.00	237.50	
DYSN	Dysan Corporation		1337.50	1975.00	637.50	
EC	Englehard Min/Chem		400.00	577.50		177.50
FTHR	Fidelity Thrift		5024.88	4929.12		<95.76>
FEQIX	Fidelity Equity Inc.		5924.88	9490.78		3565.90
HRS	Harris Corporation		525.00	547.50	22.50	
XON	Exxon		498.88	724.75	225.88	
INTC	Intel Corporation		994.58	1147.50		152.92
CRVS	Corvus		2600.00	4150.00	1550.00	
IGAM	Intl Gaming & Mktg		502.50	712.50	210.00	
VRB	Verbatim Corporation		2787.61	16387.50	13599.89	
HM	Homestake Mining		0.00	4700.00	4700.00	
VAALY	Vaal Reefs Explor		1031.78	1780.00		748.22
PSB	Philbro		1575.00	2756.25	1181.25	
Total			32095.79	61572.52	24297.95	5178.78
			Total Gain/<Loss> of is			
			29476.73			

DESCRIPTION AND PRICE						
Today's Date 12/1/82			Last Updated 11/29/82			
Symbol	Description	Purchase Date	No. of Shares	Purchase Price	Last Price	Commission
IBM	Intl Bus. Machines	5/1/74	28.0000	54	86 1/2	0.00
ASTR	Astrosystems	12/8/82	87.0000	5 3/8	10 7/8	0.00
NOM	Natomas Corp	12/8/82	19.0000	26 3/4	16 1/2	0.00
OXY	Occidental Petroleum	12/8/82	20.0000	35	18 3/8	0.00
TNDM	Tandem Computer	7/10/82	180.0000	21 21/64	31 1/2	48.75
DYSN	Dysan Corporation	1/29/82	100.0000	17 3/8	19 3/4	0.00
DYSN	Dysan Corporation	3/18/82	100.0000	13 3/8	19 3/4	0.00
EC	Englehard Min/Chem	2/26/81	20.0000	20	28 7/8	0.00
FTHR	Fidelity Thrift	7/5/78	504.0000	9 31/32	9 25/32	0.00
FEQIX	Fidelity Equity Inc.	10/21/76	422.0000	14 3/64	22 31/64	0.00
HRS	Harris Corporation	12/8/82	15.0000	35	36 1/2	0.00
XON	Exxon	12/8/82	26.0000	19 3/16	27 7/8	0.00
INTC	Intel Corporation	7/10/80	30.0000	32	38 1/4	34.58
CRVS	Corvus	2/23/82	200.0000	13	20 3/4	0.00
IGAM	Intl Gaming & Mktg	12/8/82	60.0000	8 3/8	11 7/8	0.00
VRB	Verbatim Corporation	2/20/82	300.0000	9	54 5/8	87.61
HM	Homestake Mining	11/26/82	100.0000		47	0.00
VAALY	Vaal Reefs Explor	5/1/74	20.0000	50 1/4	89	26.76
PSB	Philbro	12/1/82	50.0000	31 1/2	55 1/8	0.00

requires an absolute minimum of effort. The flow chart menu makes the program's different functions easy to follow. It's an innovative concept, and more software companies should consider using this handy feature.

Updating Your Portfolio

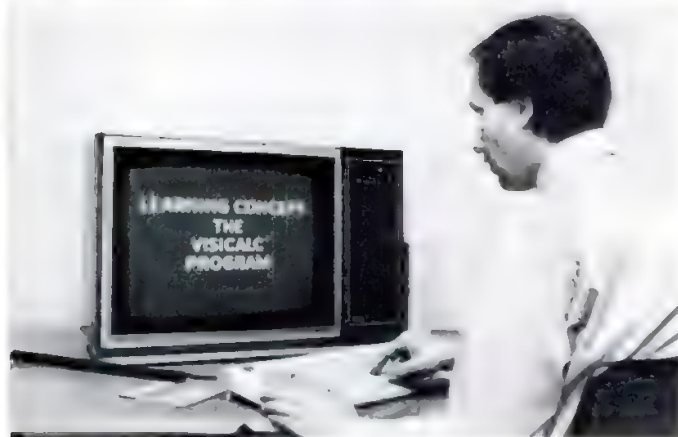
Once the equities and their ticker symbols, purchase dates, prices, shares, and commission fees have been entered in the Add/Change Securities portion of the program, you only have to log-on to Dow

Jones to update a portfolio. The program stores trading volume, high/low and last prices, closing price, opening price, and net change. Information saved from the Over-the-Counter exchange includes volume, ask and bid prices, and spread calculations. In addition, Personal Investor maintains records of purchases and commissions, calculates net gains and losses, and provides a tax report of the sales transactions that includes profit and loss amounts and dividend yields (see Figure 1). Each of the program's five reports (De-

scription, Quotes, Gain/Loss, Dividend, and Tax) may be printed. But the program will not run if the printer is either off or off-line, an important piece of information that is not mentioned until Section 16 of the manual.

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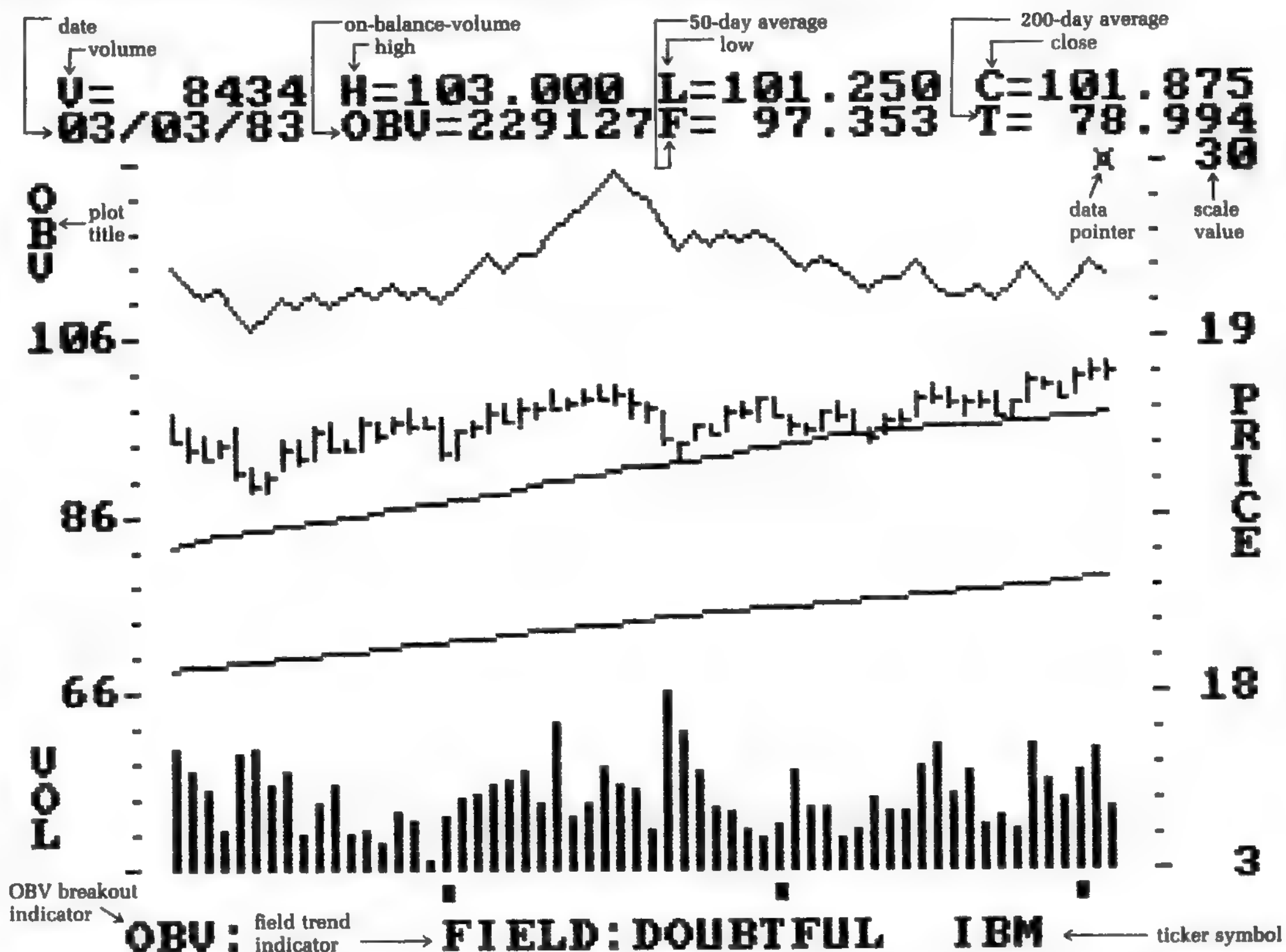
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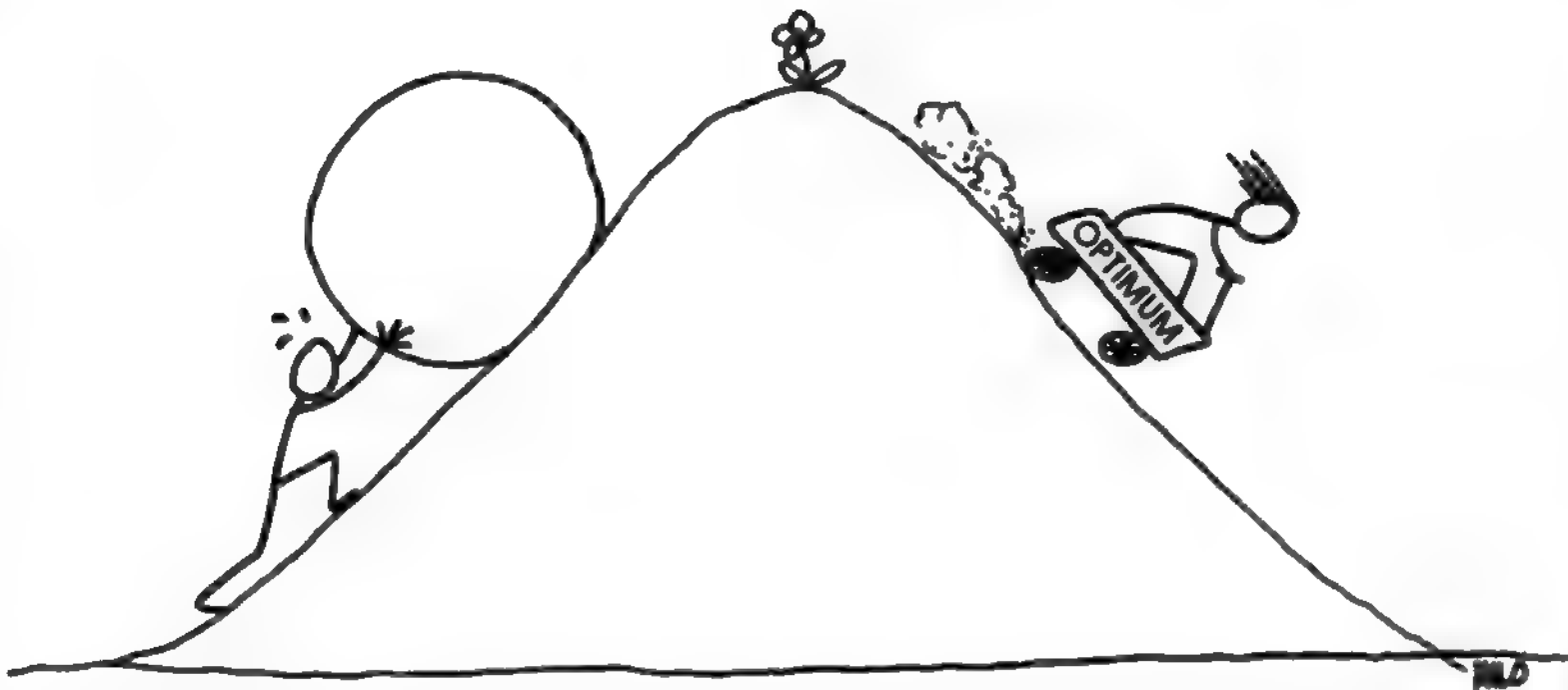
Figure 2: STOCKCHART-II graph indicating daily high, low, and closing stock prices



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DATE	HIGH	LOW	CLOSE	VOLUME	OBV	INDIC	FIELD	DATE	HIGH	LOW	CLOSE	VOLUME	OBV	INDIC	FIELD
12/08/82	97.500	94.500	94.500	13135	234592		DOUBTFUL	01/20/83	98.750	96.750	97.875	6278	278513		RISING
12/09/82	96.000	92.500	93.625	11185	223407		DOUBTFUL	01/21/83	97.500	94.000	94.625	17851	260662		RISING
12/10/82	95.125	92.375	92.750	9575	213832		DOUBTFUL	01/24/83	94.125	92.250	93.875	14775	245887		RISING
12/13/82	94.750	93.125	93.875	6542	220374		DOUBTFUL	01/25/83	96.250	94.375	96.000	11336	257223		RISING
12/14/82	96.250	90.500	91.000	12874	207500	DOWN	DOUBTFUL	01/26/83	96.125	94.875	95.125	8425	248798		RISING
12/15/82	91.500	89.125	89.375	13059	194441	DOWN	DOUBTFUL	01/27/83	98.000	95.750	97.625	7926	256724		RISING
12/16/82	91.250	89.000	90.750	9979	204420		DOUBTFUL	01/28/83	98.500	97.125	97.375	6338	250386		RISING
12/17/82	94.625	91.500	93.625	11430	215850		DOUBTFUL	01/31/83	98.875	96.750	98.875	5742	256128		RISING
12/20/82	94.625	92.000	92.500	6139	209711		DOUBTFUL	02/01/83	99.250	97.000	97.000	6602	249526	DOWN	RISING
12/21/82	96.000	92.500	95.750	8701	218412	UP	DOUBTFUL	02/02/83	97.250	95.250	96.000	11219	238307	DOWN	RISING
12/22/82	96.375	93.500	93.500	10148	208264	DOWN	DOUBTFUL	02/03/83	96.000	95.125	95.500	8164	230143	DOWN	RISING
12/23/82	94.500	93.500	93.625	5900	214164		DOUBTFUL	02/04/83	97.500	95.375	97.375	8750	238493		RISING
12/27/82	96.875	93.375	96.375	6470	220634	UP	RISING	02/07/83	98.375	96.625	97.125	5634	232859		RISING
12/28/82	96.375	94.750	95.125	5375	215259		RISING	02/08/83	97.375	95.000	95.125	6435	226424	DOWN	RISING
12/29/82	97.250	95.375	96.625	7999	223258	UP	RISING	02/09/83	95.500	93.875	94.500	9127	217297	DOWN	RISING
12/30/82	98.000	95.750	96.125	7254	216004		RISING	02/10/83	96.875	95.125	96.375	7712	225009		RISING
12/31/82	97.125	96.125	96.250	3737	219741		RISING	02/11/83	97.750	96.000	96.375	7910	225009		RISING
01/03/83	97.000	92.500	93.000	7606	212135	DOWN	RISING	02/14/83	99.500	97.000	99.000	11451	236460	UP	RISING
01/04/83	95.625	92.375	95.625	9110	221245	UP	RISING	02/15/83	100.500	98.750	98.875	13528	222932	DOWN	RISING
01/05/83	96.750	95.000	96.000	9509	230754	UP	RISING	02/16/83	100.250	98.250	98.375	9396	213536	DOWN	DOUBTFUL
01/06/83	98.500	95.500	97.625	10242	240996	UP	RISING	02/17/83	99.000	97.000	98.375	11169	213536	DOWN	DOUBTFUL
01/07/83	98.375	96.500	96.625	10606	230390		RISING	02/18/83	99.500	98.250	98.625	6717	220253		DOUBTFUL
01/10/83	99.250	96.000	98.000	11142	241532	UP	RISING	02/22/83	99.500	97.000	97.125	7464	212789	DOWN	DOUBTFUL
01/11/83	98.375	97.000	98.000	8509	241532	UP	RISING	02/23/83	98.750	97.125	98.750	6396	219185		DOUBTFUL
01/12/83	100.125	98.000	98.125	15259	256791	UP	RISING	02/24/83	101.500	98.750	100.875	13656	232841	UP	DOUBTFUL
01/13/83	99.250	98.125	98.625	7350	264141	UP	RISING	02/25/83	101.250	100.000	100.375	10521	222320		DOUBTFUL
01/14/83	99.875	98.500	99.125	8740	272881	UP	RISING	02/28/83	100.500	99.000	99.000	9106	213214		DOUBTFUL
01/17/83	100.750	99.250	99.250	11447	284328	UP	RISING	03/01/83	101.875	99.625	101.750	11065	224279		DOUBTFUL
01/18/83	100.375	98.500	99.625	10150	294478	UP	RISING	03/02/83	103.000	101.250	102.125	13282	237561	UP	DOUBTFUL
01/19/83	100.250	97.000	98.500	9687	284791		RISING	03/03/83	103.000	101.250	101.875	8434	229127		DOUBTFUL

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verted, stored, and reported as a fraction to remain consistent with the Dow Jones quote format.

Poor Recordkeeping

Unfortunately, *Personal Investor* does not retain any portfolio history. When a stock splits, the original purchase record is changed to reflect the new number of shares and the new per share price; only the purchase date remains in the historical record. In addition, since each Dow Jones update writes over the previous log-on data, daily records are not maintained. When equities are sold, they are removed

from the list automatically and transferred to the tax report.

Suggestions For Improvement

Although *Personal Investor* is a well-structured program, a few features should be added. For example, the program contains no alphabetic sort feature, and anyone monitoring a large portfolio may have to hunt for a particular item among the printed listings, which appear in the same order as they are entered. Since 700 purchases and up to 300 stocks can be stored on one data disk, the ability to print out a sizable portfolio in alphabetical order

seems mandatory.

Although the program contains a field for the ex-dividend date, no provision is made for adding a tickler date or for flagging a particular item. For example, you cannot maintain an open orders log to note which orders are "Good Till Canceled." As for the omission of a tickler file, even small investors would find this feature useful as a reminder of an annual meeting, a quarterly earnings report, or an expiration date of an option.

A graphics generator would also be a welcome addition to the program, because successful investing more often results from relative comparisons rather than from absolute values. Since the program does not maintain a daily price record, even the DIF feature cannot be transferred to plot price fluctuation or volume without re-entering the data manually.

The Price Is Right

Personal Investor's \$145 price tag includes a standard Dow Jones subscription and password—a \$50 value—along with a free hour of nonprime time usage. Depending upon the service selected, this free hour can be worth anywhere from \$12 to \$54. Thus, the program pays in part for itself.

The updated version includes the original manual and a 12-page addendum outlining changes made in the program. Owners of the original version may purchase the update for \$10 but should be prepared to re-enter their portfolio data on the new data disk.

Stockchart-II
Micro-Investment Software
9621 Bowie Way
Stockton, CA 95209
(209) 952-8833
List Price: \$500

Optional Annual Maintenance Fee: \$75
Requires: 128K RAM, two disk drives, asynchronous communications adapter and modem, color graphics adapter, color monochrome monitor, dot matrix printer.

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Stockchart-II is a market graphics package designed specifically for performing technical analysis. The program automatically connects the PC to the Dow Jones News/Retrieval Service to update stock portfolios. After the daily quotes have been retrieved, the program will calculate the

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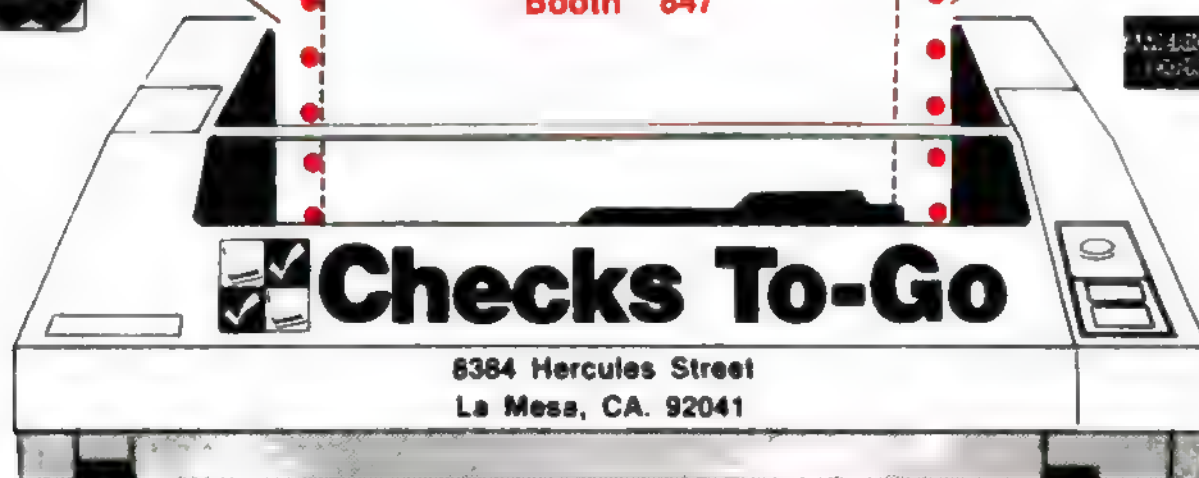
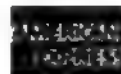
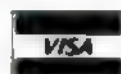
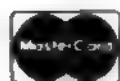
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50- and 200-day moving averages and the on-balance volume. In addition, it will analyze the statistics for volume breakout and indicate current field trends. After all the calculations have been completed, you can use the program's graphing capabilities to generate charts that plot daily high, low, and closing stock prices (see Figure 2). Moving averages and daily and on-balance volumes may also be plotted. In addition, StockChart-II has been expanded to include OTC stocks and warrants.

StockChart-II appears to be weighted toward technical traders who are more

interested in spotting trends than in monitoring paper profits and losses. The program is not intended for portfolio management; it cannot be used to record purchase amounts, commission fees, or sales information.

Investors who subscribe to stock market analyzer Joseph Granville's "on-balance volume theory" should welcome this program. Granville's postulation is that price trends can be detected by following imbalances of supply and demand.

Disk Swapping

Getting started requires a bit of confus-

ing disk swapping and copying.

Stockchart-II comes with two disks; the first contains the master program and the second acts as the utility disk. Since the files will fit onto one double-sided floppy, and since two additional data disks are required to use the program, you should probably copy the master files onto the same disk.

Each data disk allows you to monitor a maximum of 20 stocks. In order to do this, you must set up a disk containing the communication information (baud rate and password), then connect it with the Dow Jones News/Retrieval Service. This disk will be used to collect current and historical quotes. According to the documentation, up to 264 days of quote information can be retrieved.

On the second data disk, you must enter the ticker symbols and company names. This information is then copied to the quotes disk. Since Stockchart-II does not monitor gains/losses or dividends, no provision is included for entering purchase information. When the maximum of 20 stocks has been entered, you are given the choice of saving or discarding your entries.

Drawbacks

Stockchart-II employs IBM's special function keys, and the use of each is carefully described in the documentation. Although it updates stock quotes automatically, the program does not include subscription to the Dow Jones News/Retrieval Service and data may not be entered manually. Thus, Stockchart-II cannot be used to retrieve financial news, corporate earnings reports, and other types of information available from Dow Jones.

Graphics Capabilities

The strength of the program lies in its graphics capabilities. Graphing the daily price and volume totals with Stockchart-II provides a dynamic image of trends that cannot be achieved by looking at rows or columns of numbers. Running the program is not a simple task, however, because each update requires three disks. Furthermore, dumping the data to the printer takes a minimum of one and one-half minutes. If you are tracking 20 stocks, the time you will spend using Stockchart-II is extensive, unless compared to the time and the tedious work that would be

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required to produce the calculations and charts manually.

Although Stockchart-II's hardware requirements seem hefty (double drive system with 128K RAM, asynchronous communication adapter and modem, color graphics adapter, color or monochrome monitor, dot matrix printer with graphics capabilities), its configuration is now almost standard, as evidenced by the development of the PC XT. It also contains no special system call that would affect its ability to function under DOS 2.0.

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STOCKCHART-II
*appears to be weighted
toward technical traders
who are more interested
in spotting trends than
in monitoring paper
profits and losses.*

In order to run the program, you manually enter data such as transaction date, call price, strike price, stock price, option expiration date, and commission cost. The program then outputs the amount of time remaining on the option, the option price

at which profits start, and the price at which underlying stock must be sold at expiration in order to make the trade profitable. To determine how well the stock must perform over time in order to make a profit, the program provides either a percentage increase over the life of the option or as an annualized percentage increase.

In a similar fashion, the program handles the purchase of puts and can give basic information on the more complex transactions of straddles and spreads.

Covered Calls

Many investors are interested in selling an option when they hold the underlying stock. This type of investment, known as the "sale of a covered call," assures a definite return on stocks held in one's portfolio regardless of market fluctuations. Using two different input screens—one that prompts for information about the stock held and another that asks for data on the option to be sold—Options will calculate relative interest costs if the stock is margined. If the call runs to expiration or if the call is exer-

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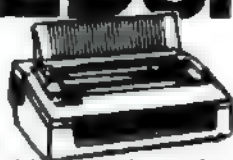
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determine the expected rate of return on these transactions. It also calculates an annualized rate of return on various trading strategies and predicts net profit and loss.

The package is very easy to use and the graphic representation makes analysis very straightforward. These can be displayed on a green screen (not the IBM monochrome, unfortunately) or on an RGB color monitor. At the time of this evaluation it was not possible to dump the content of the screen for hard copy, but this capability will be added by the manufacturer soon. The other item (expected but not yet available) is a communications enhancement that permits automatic entry of settlement price through a 300-baud modem. This is essential for tracking large numbers of commodities.

A Useful Tutorial

The documentation for COTS is well-organized and, considering the complexity of the topic, it is surprisingly easy to understand. The documentation, combined with the easy-to-follow color graph-

ics, serves as a useful tutorial for the less experienced. Since the program deals pri-

THE RAPID appearance of COTS is reminiscent of the time after the IBM-PC was first announced when a few well organized groups were ready to market support items within months after its release.

marily with a specialized area of investment analysis, however, it will probably be more appealing to the seasoned investor or the professional trader. Its price is

more reasonable for this group rather than for anyone who dabbles with a bit of risk capital. Nevertheless, it is a very good package and can be as simple or complex as the needs of the user. Some may consider COTS too expensive but, in the purchase of investment software, only the individual can determine what is "fair value."

Hope for the Future

These are only a few of the investment programs that are presently available for the PC. Many new programs are under development. The stock market is not a very forgiving place, and software that provides organization, timely data, and analytic capabilities should be part of a serious investor's library.

Caveat

Stocks shown in the reports are not included as recommendations to the readers, nor are they intended to present a balanced portfolio. The examples that were selected are heavily biased toward high-risk, high-technology equities. /PC

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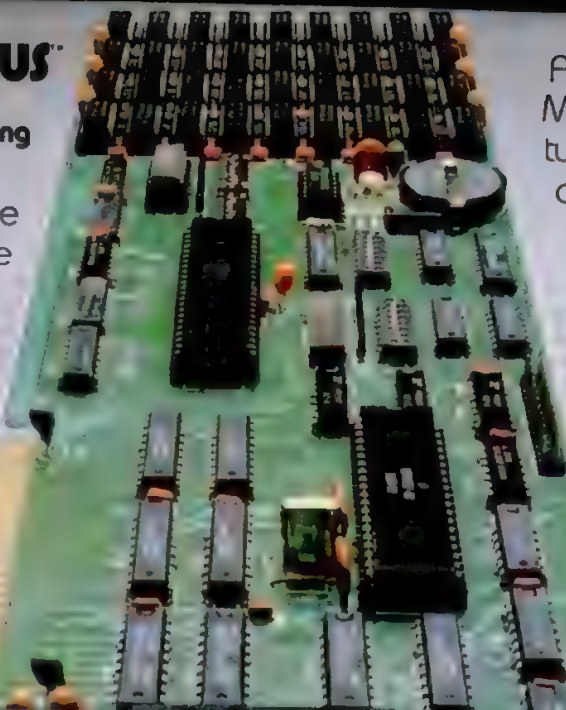
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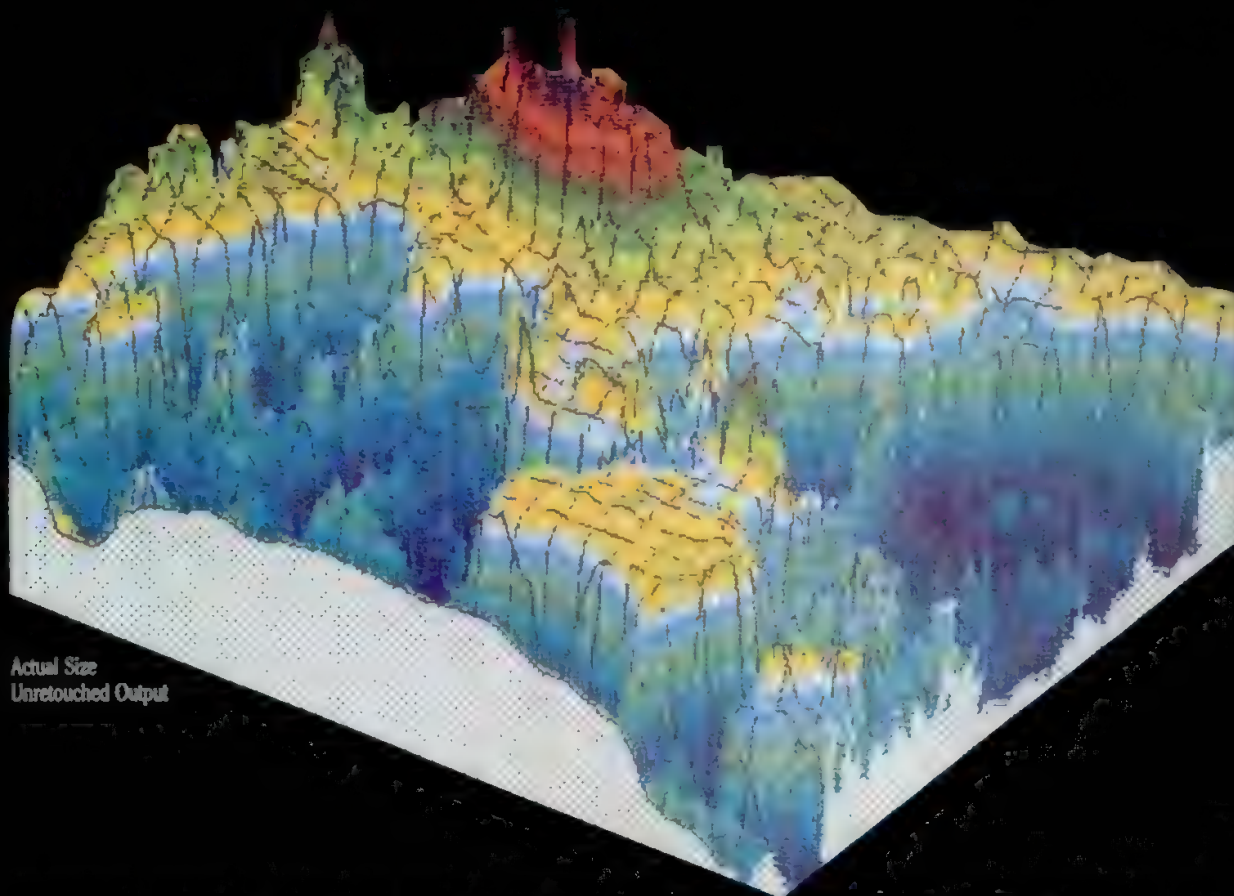
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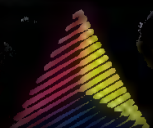
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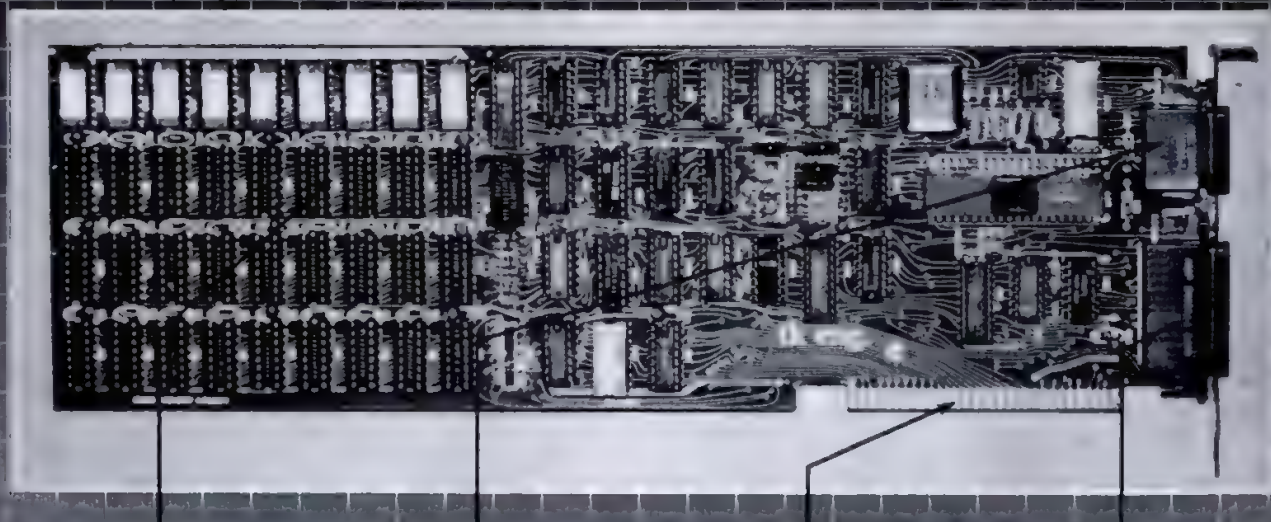
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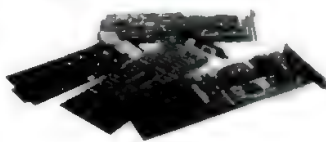
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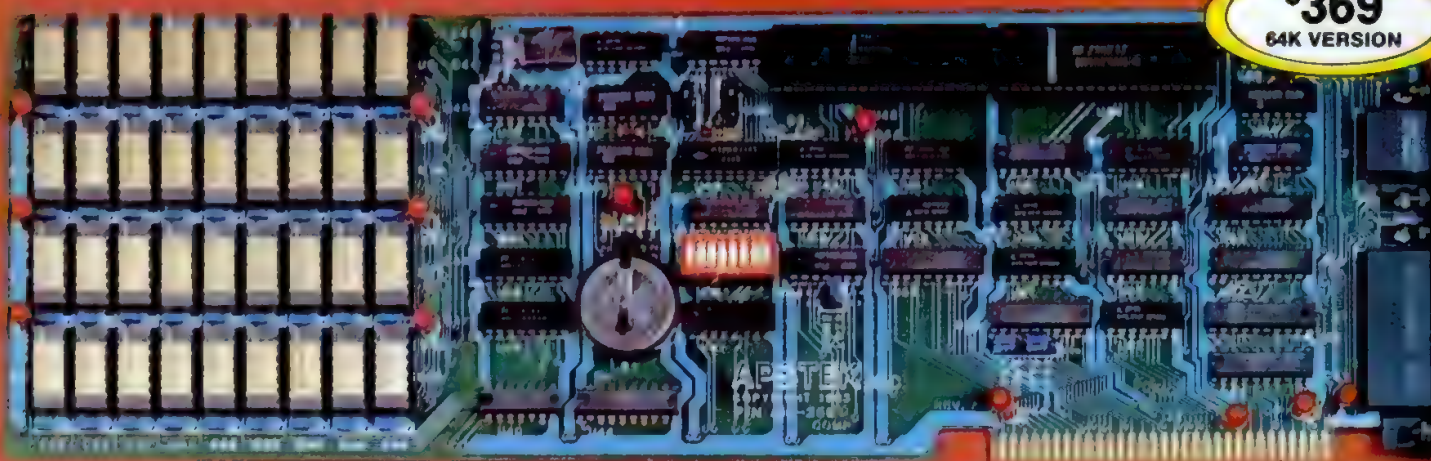
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The PC gives you the means to play and compose music in a way that J.S. Bach, Benjamin Franklin, and Stephen Foster could only have dreamed of.



A Musical "Invention"

The potential of the IBM Personal Computer for word processing, spreadsheet, data base, and graphics applications has been eagerly exploited by users and programmers. In comparison, the PC's ability to play music has remained one of its best kept secrets. If you've never thought of your PC as a musical instrument, instructions in this article could start you playing your first computer melodies—even three-part compositions.

Speaking of secrets, the following scene from the past should illustrate the proud musical heritage of the Personal Computer.

A Note From the Past

The year is 1749. The setting, the music room of the Thomasschule in Leipzig, Germany. Instruments of all kinds clutter the room: harpsichords, clavi-

chords, violoncellos, violins, and the ultra-modern pedal harp. Against one wall is an enormous keyboard contraption with foot pedals and a monitor screen. From one side of this ungainly instrument protrudes a monstrous trumpet-like appendage.

The occasion is an interview with the school's resident cantor and organist, one Johann Sebastian Bach, who has recently become a celebrity following a performance of his "Fugue in D minor for Three Harpsichords with Pocket Comb Continuo" in Munich. The composer, a flamboyant little man in his late 60s, poses proudly in front of his massive instrument. He's wearing baggy peach-satin breeches over white hose, topped by a worn velvet doublet of mauve, from the front of which cascades a jabot of slightly soiled lace. His crimped and powdered wig, a trifle askew

on the balding forehead, has left powdery traces on his velvet shoulders.

Conducting the interview is a 43-year-old American visitor by the name of Benjamin Franklin, publisher and editor of the *Pennsylvania Gazette*. A cheerful, pudding-faced man, his sparse hair drawn back at the nape with a grosgrain ribbon, Franklin is dressed simply in brown serge and wears metal-rimmed half-spectacles. He exudes an aura of home-spun Colonial simplicity.

"Well, Herr Bach, or is it Professor Bach—?"

"Please, just call me Johann."

"Shall we begin? I'm sure our readers in the Colonies would like to learn something about your musical genius, and the methods you use to preserve it for posterity. For instance, your new Fugue in D minor. You amazed us by performing it

without written music. Can you tell me, was it scored in the conventional European manner, or by solfeggio, or do you have your own shorthand method?"

Bach smiles modestly and reaches out to stroke reverently the object of his pride. "You see this machine? This revolutionary electronic marvel will one day astound the musical world! This machine I have myself built from spare parts and connected to my own generator. With it I compose my fantastic fugues, my captivating cantatas, my soaring symphonias."

"Incredible. Especially since electricity hasn't yet been discovered. You know, I've recently been wondering whether a kite string and a metal key might ... hmm. You say this machine of yours is electronic? What do you call it?"

"P.C."

"P.C.?"

"Precocious Clavichord."

"Catchy. It sounds like an offspring of your Well Tempered Clavichord. And how does it work?"

"Well, on this keyboard you punch out the melody and store it in the memory.



T HIS revolutionary electronic marvel will one day astound the musical world.

Same with the harmony, then the bass. When all is stored, you simply push this RN key."

"And do the foot pedals control the volume?"

"No, dumkopf. You pump those to run the generator."

"And what's this you've got going on the side?"

"Gott in Himmel, Yankee whippersnapper! You traveled 4,000 miles to pry into my love life?"

"No, no—I mean this trumpet thing."

"Ah, yes, my Heidel-Horn. Very user-friendly. The music, it comes out from the Heidel-Horn, loud and clear. We use it for fire-shrieken also, and for summoning the kinder to class from their homes."

"Very impressive. No, no, don't bother to demonstrate. You have a fairly large family of your own, I understand?"

"Fairly. Seven kinder from my first wife Maria. And just when I was getting the hang of it, she up and died. Kaput. Then 13 more kinder from my second wife Anna. That is ... how do you Colonists say it?—a butcher's dozen!"

"Baker's. Unbelievable! 20 children. So prolific, and with your music, too. All those concertos, sonatas and cantatas."

"Ah, wait until you hear my latest! Day and night and in-between I've been working. I call this masterpiece, 'Concerto in G Flat for Flugelhorn and Flute, With Counterpoint by Gut-Bucket.' In the second movement there's a moving solo passage for the kazoo. It's enough to make you cry."

"I can well believe it. About how long does it take you to write a composition of this calibre?"

"On the P.C.? Oh, years and years. You see, the kinder, they also use my P.C. day and night. They've invented this game where they shoot down invaders from France, with sound-effects on the Heidel-Horn. Care to try it?"

"Some other time, perhaps. I must run to catch that 2 p.m. packet. But thank you again, Johann, you've been most kind. With an in-depth interview like this, I'm sure our circulation will triple. I'll send you a tear sheet."

"Very kind. And you represent, again?"

"The Pennsylvania Gazette."

"Ah, yes, one of my favorites. It's that peppy dance number in 4/4 time?"

"Not gavotte, gazette. Gazette!"

"Gezundheit."

It could have happened. Franklin the inventor and Bach the composer were contemporaries. Bach did in fact have 20 children by his two wives and was rather unconventional, for his staid time, with

musical experiments. Not content with his two concertos for violin and orchestra, he went on to write a concerto for two violins and orchestra, four concertos for harp-



T O COMPOSE—or even catalog—so much music, Bach would have needed a computer.

sichord and orchestra, two concertos for two harpsichords and orchestra, and two concertos for three harpsichords and orchestra, as well as hundreds of cantatas, preludes, fugues, sonatas, toccatas, etc., for various combinations of voices and instruments. To compose—or even catalog—so much music, Bach would have needed a computer.

In the early 1800s, digital and analog computers were brainstormed, but never constructed. Unrecorded inventions could have occurred earlier. And Bach kept up with the state of the art in musical instruments; he was one of the first musicians to try playing a prototype piano.

On the IBM PC, programming and playing music is much simpler than with Bach's legendary contraption. For one thing, there's no pedal-pumping needed to boot up the system; for another, the Heidel-Horn is less obtrusive. The quality of the music produced on the PC will never make Carnegie Hall however, particularly in the buzzy lower register. If you're composing for posterity, it might be safer to avoid the lower octaves.

Composing in BASIC

The Play command in Advanced BA-

SIC (BASICA) is used for music. Advanced programmers able to write their own languages would be capable of inventing means to produce better-quality music than is possible with BASIC, however.

In BASIC, the notes themselves are indicated by the letters A through G; each octave starts with C and ends at B. To indicate a sharp, a # symbol or + is used after the letter; a - indicates a flat.

L, followed by a number, indicates the length of each note. L1 is a whole note, L2 a half note, L4 a quarter note, and so on. The number length may range from one to sixty-four. A series of notes may be written F4E8G2. F4 is the same as L4F; both mean "play the note F as a quarter note."

A dot after a note has the same meaning as in written music; the note's length is increased by half of its value. For instance, G1 will play G for the length of a whole note and a half note run together.

MN stands for Music Normal, meaning each note will sound for $\frac{1}{4}$ of the time specified by L, this results in a slight pause between each note. MN is the default, but ML or MS can be specified.

ML indicates Music Legato, meaning each note will sound for the full period set by L. When this is in effect, adjacent notes on the same pitch will be run together without a break in sound, like tied notes.

MS indicates Music Staccato, meaning each note will play only $\frac{1}{4}$ of the time

MUSIC

Normal results in a slight pause between each note.

specified by L. The effect is similar to pizzicato on violin.

N indicates Note, ranging from 0 to 84. On the PC there are seven possible octaves, for a total of 84 notes, only four less than the piano keyboard.

O indicates Octave. There are seven octaves, 0 through 6, each starting with C and ending with B. Octave 3 starts with

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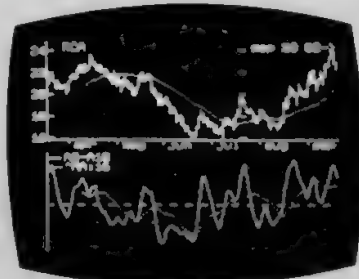
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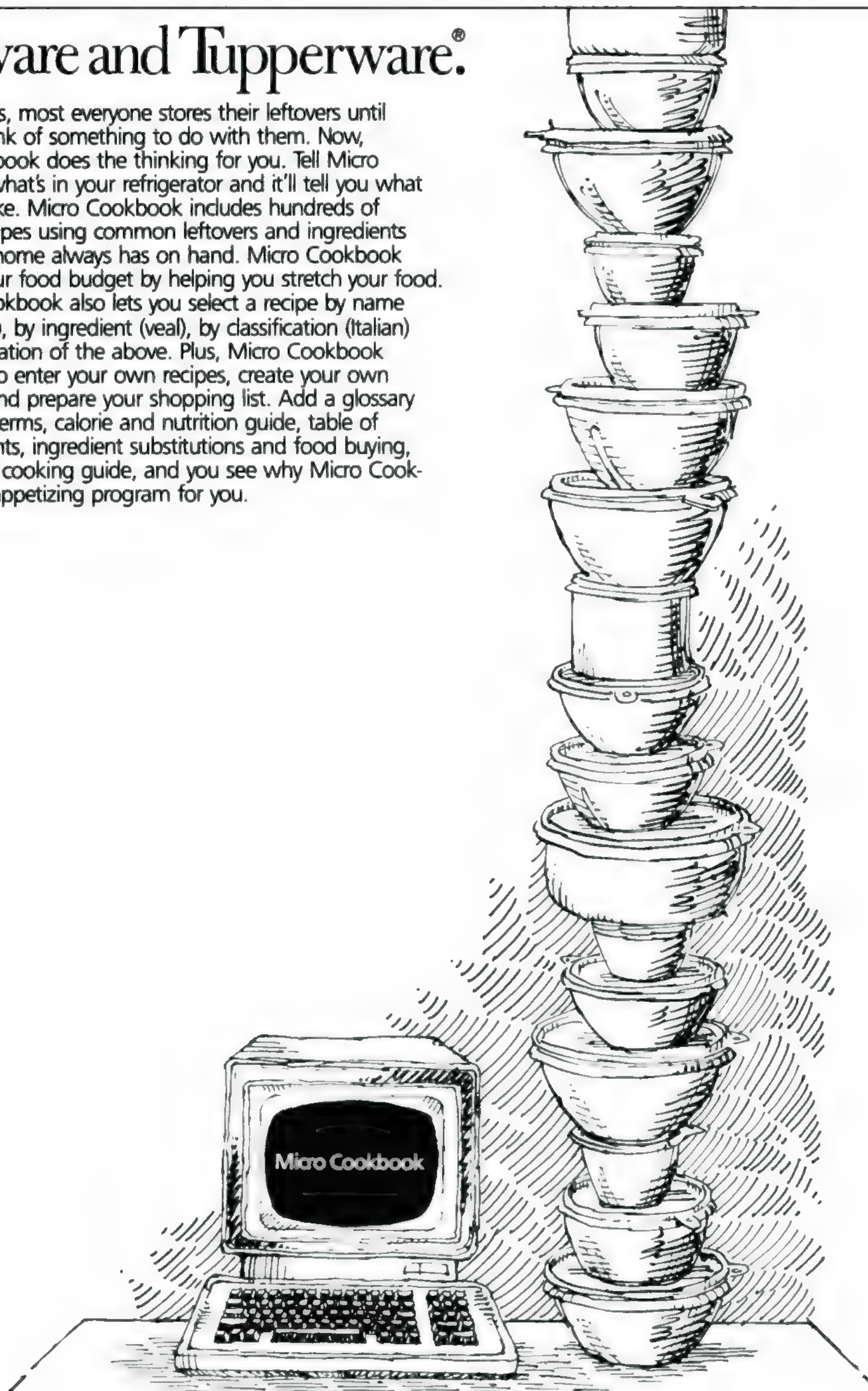
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Figure 1: BASIC statements for a three-part version of "Beautiful Dreamer."

Melody Line
 PLAY "MLT11004C403B404C403G2.E2.D4D-4D4A1"
Harmony Line
 PLAY "MNT11003E4E-4E4E2.C2.02A4A4A403F1"
Bass Line
 PLAY "MST11002C4G4G4C4G4G4C4G4G4D4F4D4F4D4F4D4F4"
Introduction to Melody Line
 PLAY "MNT11003C4G4G4C4G4G4"

Figure 2: Musical notation of "Beautiful Dreamer," equivalent to the BASIC statements in Figure 1.



Middle C. Be sure you use the letter O, and not the numeral 0, when keying in an octave change. The octaves you'll use most will probably be O2 and O3, as they have the best fidelity. Very high notes (above Octave 4) are apt to be tweety, and low ones (below E in Octave 1) tend to growl and be off-key, at least through the tiny speakers in the PC.

P indicates Pause or rest. You indicate the duration of Pause in the same way as L, from 1 to 64. (P4 would be a quarter-note rest.)

T indicates Tempo, setting the number of quarter notes in a minute, from 32 to 255. The default is 120. As an example of

the use of tempo, ascending 16th notes on ML at a T250 speed produce an approximation of a run or arpeggio.

If you find stanzas that repeat throughout a song, you can use If/Then/Else statements to repeat strings you've already written.

Switched-On Foster

If Stephen Foster had written his "Beautiful Dreamer" on the PC, he might have started out the melody line with the BASIC statement in Figure 1.

PLAY "MLT11004C403B404C4 etc."

ML is for legato (smooth and connected); T110 is the tempo, fairly slow since

it's a gentle waltz. O4 is the octave we start with. C4 is the first note of the song, a C played as a quarter note. Since the following quarter note, B, enters a lower octave, it must be preceded by O3. The next note is the original quarter note C in Octave 4, followed by a G in the lower octave. Each time a note appears in a different octave, the change must be indicated.

The notation D-4 is for a D Flat quarter note. Since D Flat is the same as C Sharp, this note could be keyed in as C#4 or as C+4.

A harmony line to be played with this melodic phrase also might be a BASIC statement (see Figure 1).

THE
*octaves O2 and O3,
 have the best fidelity.*

PLAY "MNT11003E4E-4E4 etc."

The Music Normal command ("MN") keeps the repeated notes ("A4A4A4") from being run together without a break.

Now for the bass line (see Figure 1).

PLAY "MST11002C4G4G4 etc."

"Music Staccato" makes these notes sound like a nice, crisp "oom-pah-pah" bass.

A short introduction to the melody can be used as a coordinator, which will help when you put together the three parts on a

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recording.

PLAY "MNT11003C4G4G4C4G4G4"

Naturally, the same tempo is maintained in all parts that you plan to put together. Here the tempo is T110—that is, 110 quarter notes per minute.

All Together Now

To record your PC music, you'll need to set up two music-quality tape recorders near the computer. You might borrow one from a friend, in return for a recording of your original computer music. Now fol-

IF YOU'VE
*synchronized properly,
the melody line and the
harmony line will
perform at the same
time.*

low these steps to put the musical parts together.

1. Have two music-quality tape recorders ready to record, next to the PC.

2. Program your melody line on the PC, beginning with the introduction. (This intro will serve only as a lead-in to prompt you where to start the next recording.) Play the intro several times until you're familiar with the sound of exactly where it ends.

3. Record the introduction and the melody line on Tape Recorder #1 (T.R.#1). Rewind the tape.

4. Program the harmony line (without intro) on the PC. Have it set up ready to Run. (If it's written as a numbered program listing, be prepared to press Run. If it's a single unnumbered line (immediate mode), position cursor at end of line and prepare to hit the Return key.)

5. Set up Tape Recorder #2 (T.R.#2), ready to record sounds from both T.R.#1 and the PC.

6. Start recording with T.R.#2.

7. Play the introduction and melody line on T.R.#1, listening carefully for the exact end of the intro. At that moment, RUN the harmony line on the PC. If you've synchronized properly, the melody line and the harmony line will perform at the same time, and be recorded on T.R.#2. If not, after rewinding both tapes, repeat steps 6 and 7 until your recording is properly synchronized. Play back T.R.#2 to hear if the balance is correct. You may need to change the volume settings on the recorders or adjust their distance from the PC. When the two parts are correctly recorded on T.R.#2, then rewind the tapes.

8. Program the bass line (without intro) on the PC. Have it ready to Run.

9. The combined melody/harmony recording is now on T.R.#2, so T.R.#1 is free to record again. Make sure it's rewound and ready to record.

10. Start recording on T.R.#1. Play the melody/harmony recording on T.R.#2,

listening for the intro. At the exact end of the intro, Run the bass line on the PC. If the two machines didn't synchronize perfectly, rewind and repeat steps 9 and 10 until the musical parts coordinate to your satisfaction.

You now have recorded a three-part harmonic composition, created with your PC. Additional counterpoint and extra bass parts may be added as you wish, by repeating the same process.

Fairly simple? If you made no errors in the timing (and they'll be easy enough to correct after hearing them on the playback), the three parts should fit together like an assembly-line VW. If it's a Cadillac you're expecting, you might be better off doing your composing on a studio-quality synthesizer—or a Steinway Grand.

Although chances are slim that a big record company will beat your door down clamoring for your computer music, there are advantages in using this new instrument. Once you get the hang of it, computer composing is faster and easier than conventional scoring. Your errors show up immediately, you can revise scores easily at any time, and you can have a printout at the press of a button. And it sure beats composing on a clavichord with a pedal-powered generator and Heidel-Horn. Bach never had it so good. /PC

Bunny Hammersla is a professional artist who runs a gallery in Edmonds, Washington. She plays piano and accordion, in addition to the Personal Computer.

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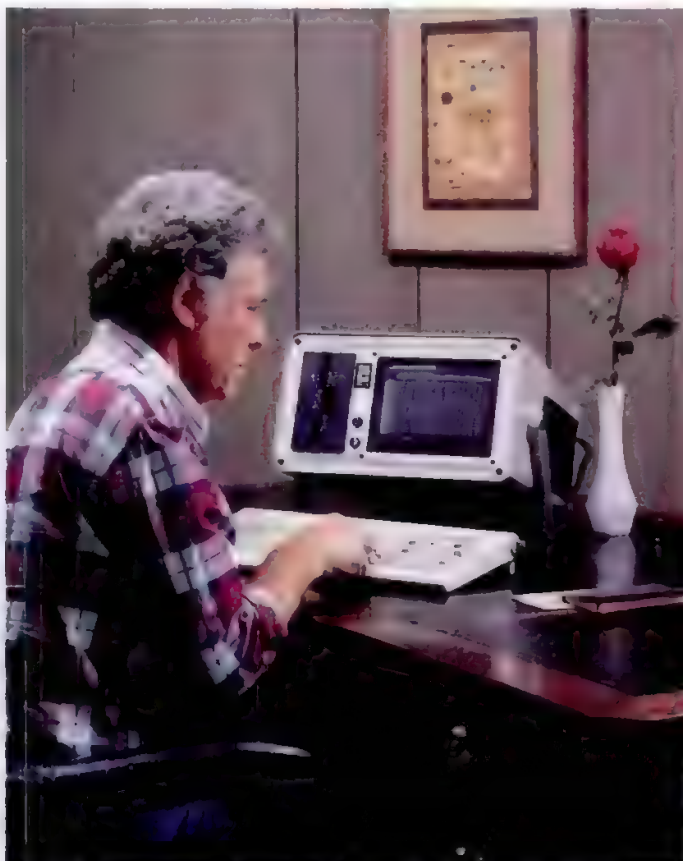
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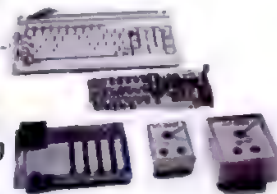
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Requires: 128K, two double-sided floppy drives, monochrome or color graphics adapter. Color graphics adapter required for on-screen charts. Printer optional.

CIRCLE 577 ON READER SERVICE CARD

This is a spreadsheet for the spread, for those who want to count their chickens before they're hatched. The AgDisk Crop/Livestock Profit Projector is a quick and easy way to tote up profit and loss on the increasingly computerized American farm.

Actually, this generally well-designed and implemented package should be viewed as a model for almost any sort of consumer financial prediction, spreadsheet or "vertical" specialized program. It is easy to see how the basic shell of the program and its accompanying documentation could be adapted to predicting the profitability of a hamburger stand or a printing plant or most any other factory that goes from raw material to finished product.

The Crop/Livestock Profit Projector includes an attractively packaged and well-

CROP/LIVESTOCK PROJECTION WORKSHEET

REPORT DATE: APRIL, 1983

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3) PRODUCT IS PRICED IN \$ PER (EX. BU. CWT).....

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PRODUCT PRICE:.....

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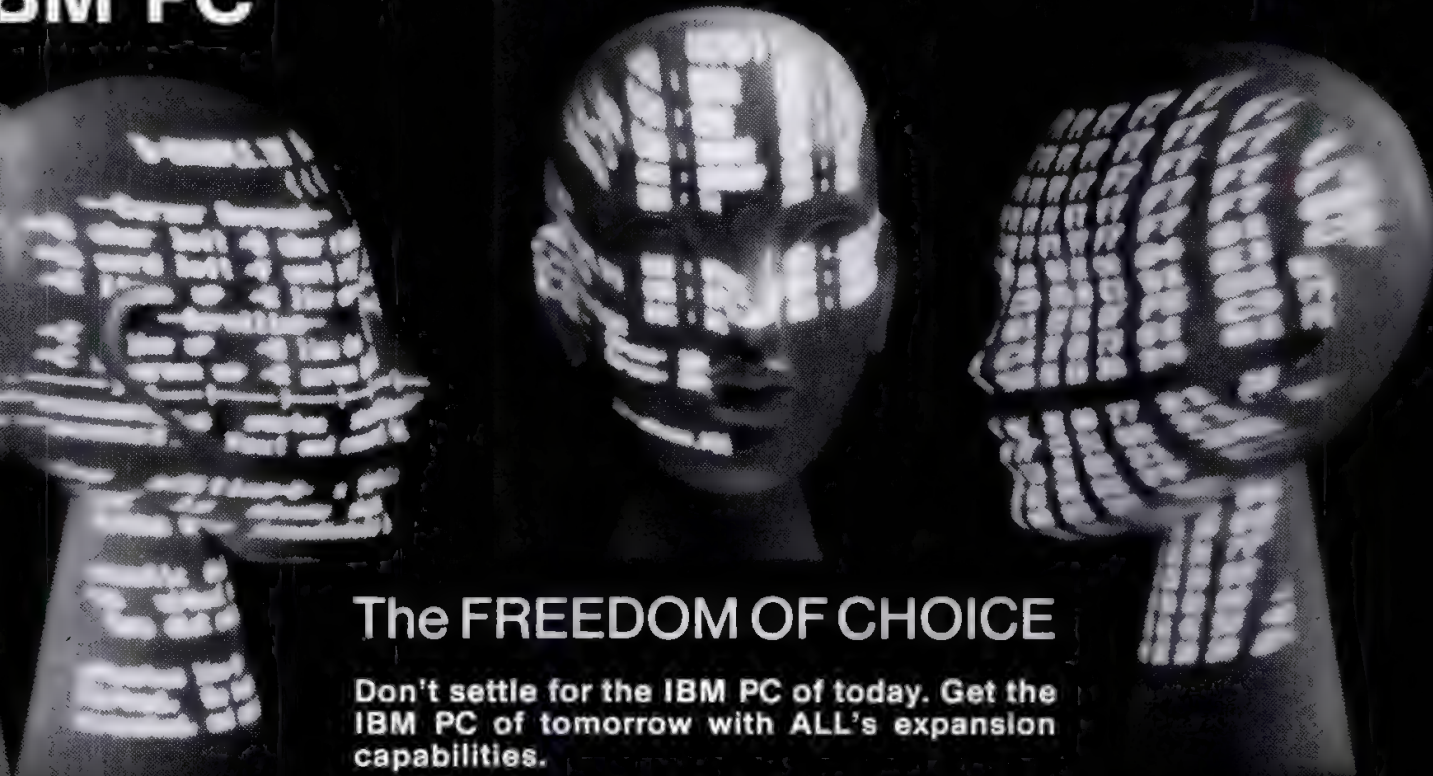
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Figure 1: The AgDisk Crop/Livestock Profit Projector can produce printed copies of the information required for its agricultural spreadsheet.

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written manual that competently explains each of the five major functions of the program: Entering projection data, reviewing or changing projections, displaying projections with on-screen graphs, printing reports, and storing or retrieving information from a data disk. The package also includes a short demonstration program. For those who prefer to pull their numbers together with paper and pencil before sitting down at the PC, it can generate printed worksheets. A beginner's road map lists the logical sequence to follow in setting up a projection, together with a key to sections of manuals.

Pluses and Minuses on Display

The copy-protected program is written in UCSD Pascal and includes its own p-System utilities for self-booting. Two copies of the program disk are provided. They will work with either display adapter installed in the PC, but require the color graphics adapter in order to draw graphs on the screen. The Crop/Livestock Profit Projector features its own special character set, using an attractive sans serif typeface for headings and sharply drawn column rules for charts and graphs. Unfortunately, however, the program coding does not take into consideration a system that might have both the monochrome and the color graphics card. On my machine I was unable to switch to the color monitor to



Figure 2: A copy of a short projection report for a mythical Park Avenue farm. As many as 24 different categories of expenses could be entered, presumably with expenses other than shoes and union dues.

The last major question asks how the product is priced: by the bushel, pound, ton, and the like.

Projecting the PC Hog Farm

Let's say your enterprise is a hog farm. Your production unit is a head and your product is sold at market in hundred-weight (CWT).

After you enter this information, the next screen presents a blank spreadsheet labeled at the top with the name of your agricultural enterprise. The first bit of information you must provide is the number of production units. In our example, "head" is already in place on the screen, waiting your numerical entry. Let's say we have 1,034 head. Next, you are asked the anticipated selling price per CWT, the unit of sale specified. A recent price for 100 pounds of pork on the hoof was \$53.50, so you enter this figure as your projected selling price. The program then asks the expected yield per head. Let's assume you are producing hefty little porkers that yield carcasses of 170 pounds or so; you would enter 1.7 CWT per head. Almost immediately, the spreadsheet is

updated to indicate the projected gross proceeds from the sale of your livestock. In this case, 1,034 head of swine of 170 pounds each at \$53.50 per CWT are worth about \$90.95 each at slaughter, or a total of about \$94,042.30 before expenses.

Next comes the entry of projected expenses. You are allowed to enter as many as 24 different expense categories, with the program automatically juggling as many as four screens worth of data. If you enter the cost per head for a particular expense, the program will calculate the total cost for your feedlot. If you know only the total cost, you can enter just that and the spreadsheet will figure out the per-head charge. And each expense immediately alters the display of the net worth of your enterprise. When all of the expenses have been entered, you can go back and make corrections or changes, with the full benefit of the electronic spreadsheet's "what if" reactions.

Going to the Files

You can use the data immediately for printing a report or to display a set of graphs on the screen. Or, the data can be

YOU ARE
*allowed to enter as
many as 24 different
expense categories.*

see the graphs. I was also unable to print out screens or graphs from the program using the PrtSc key command because of the nonstandard characters.

The program easily steps through several layers of nested Help screens. If you're starting off with a new projection, the first screen takes you to the Enter Enterprise screen. By "enterprise," the program is asking the nature of the crop: corn, hogs, chickens, etc. The next question asks for a definition of one production unit, as in an acre, head, flock, dozen.

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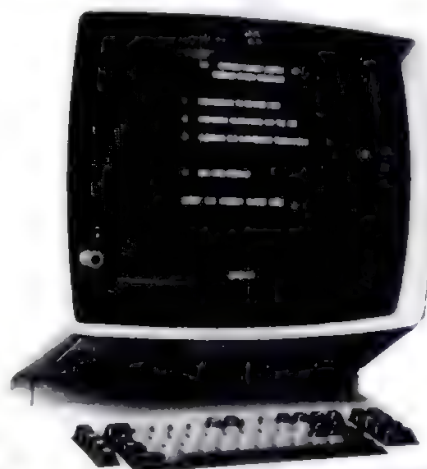
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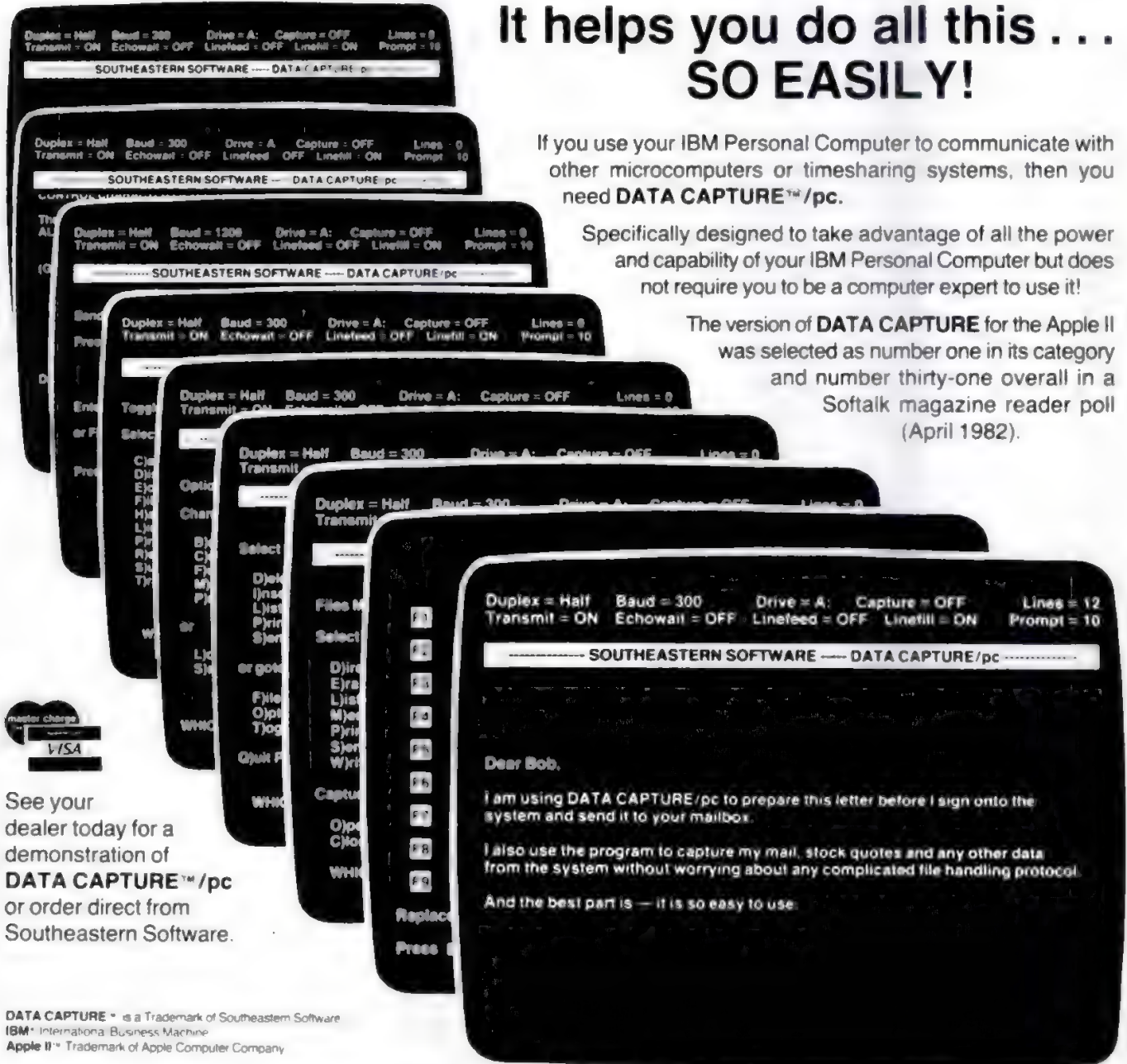
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stored on a formatted data disk for future reference and updating. The program produces a near menu-accessed directory of files on the data disk. The program only allows ten files on a double-sided disk.

One shortcoming: it insists that data be manually retrieved from the disk before changes can be made or a graph printed. It would have been simpler for the user if one segment of the program could access

another more readily.

The Crop/Livestock Profit Projector will display two types of bar graphs on a monitor driven by the color/graphics adapter: the projected expenses of an enterprise as a percentage of expected income, and an overall profit projection for any and all of the enterprises stored on the data disk. The first chart fits in nicely with the "what if" projections, although again, you must exit the "Enter Projections Mode" before entering the graph section. The program does not produce copies of the graphs on a printer or plotter, a shortcoming made even more obvious because the P-system operating system will not support PC-DOS screen dumps.

THE PROGRAM POSSESSED AN overabundance of beeps and buzzes as menus or screen prompts appeared.

Producing on Paper

The projection worksheets that can be printed from the program are near-duplicates of the on-screen prompts, and are explained in clear examples in the manual (See Figure 1). The projection report, a city boy's example of which is reproduced here as Figure 2, includes the output of the on-screen spreadsheet together with the name of the agricultural enterprise. The output could obviously be used by the farmer in a presentation to a bank or production loan company, or by a consultant working on behalf of a farmer.

The program performed well in testing, although there was one irregularly appearing bug that caused unintended cross-hatching to overwrite some of the bar graphs on the screen. The spreadsheet functions were quick and easy to learn, although as noted, the various segments of the program were a bit too isolated from each other for an experienced or hurried user. The program also possessed an overabundance of beeps and buzzes as menus or screen prompts appeared. Wouldn't want to wake the livestock too early, would you?

This product is the first of a series of programs for agricultural use, according to the manufacturer. Already out on the market for the IBM PC are Swine Management Series I, Corn/Soybean Management Series I, and a set of four volumes of templates for VisiCalc: Feedlot Management, Business Management, Cow-Calf Management, and Crop Management.

The AgDisk Crop/Livestock Profit Projector is a neat piece of work, and seems worthy of consideration for purchase down on the farm.

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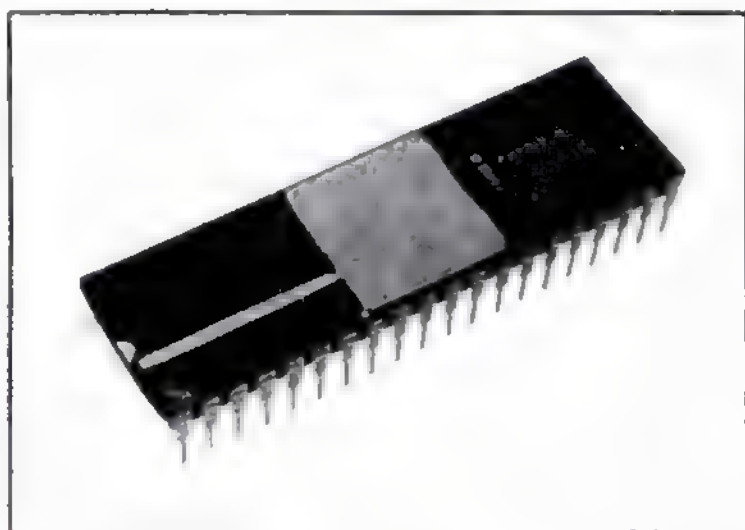
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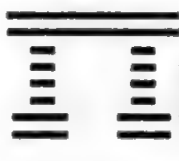
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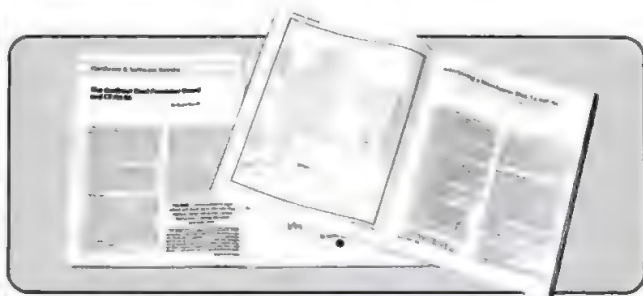
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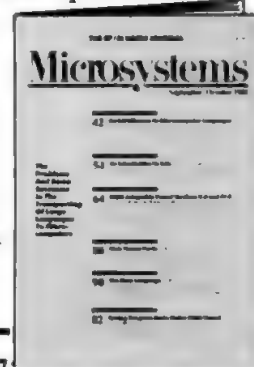
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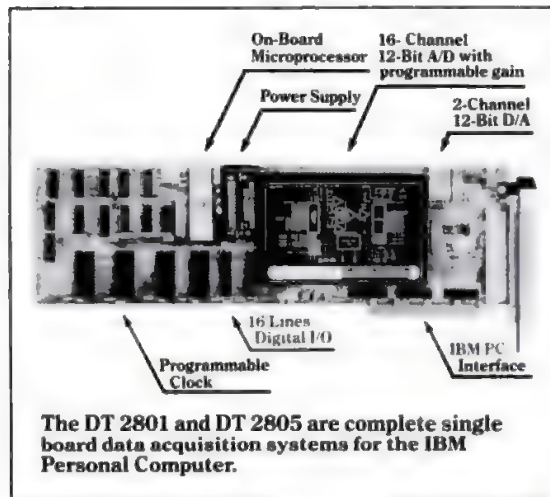
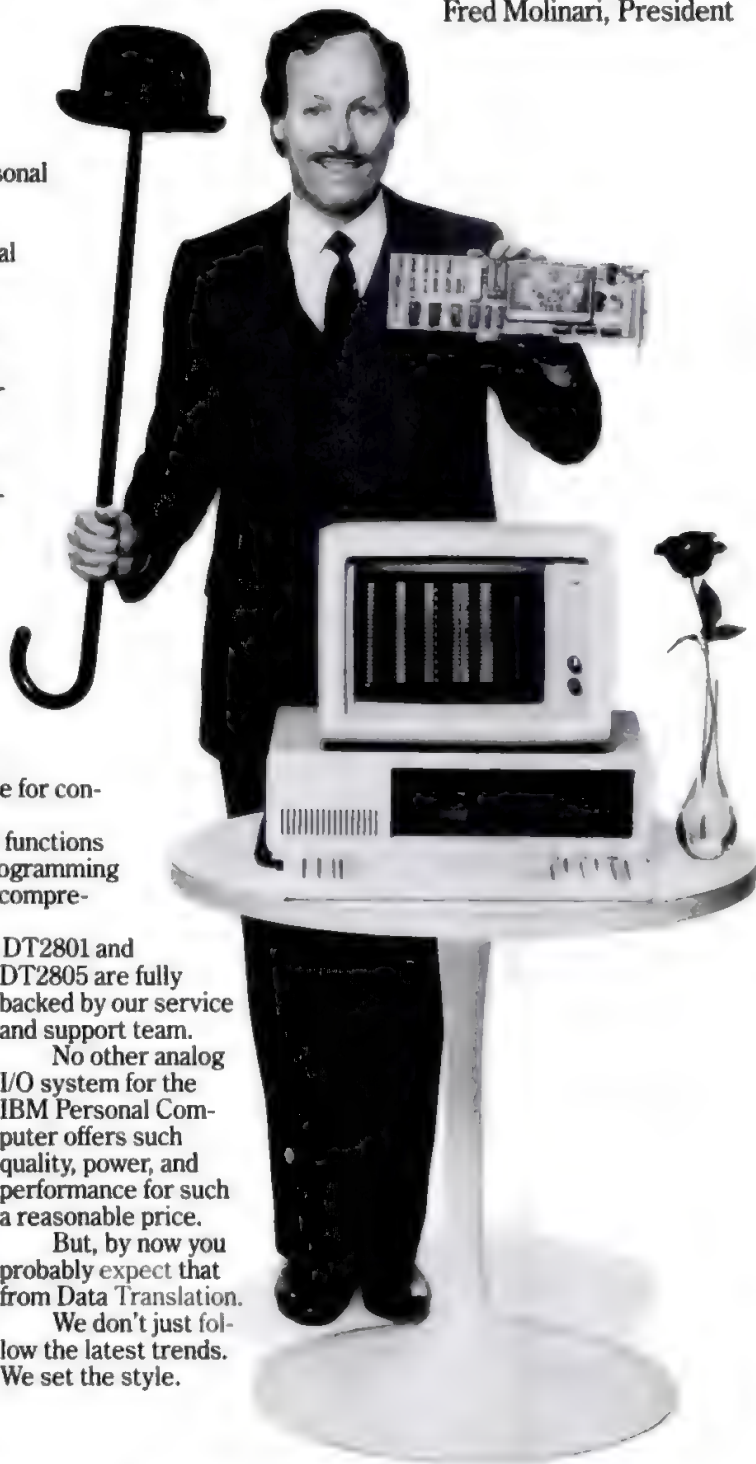
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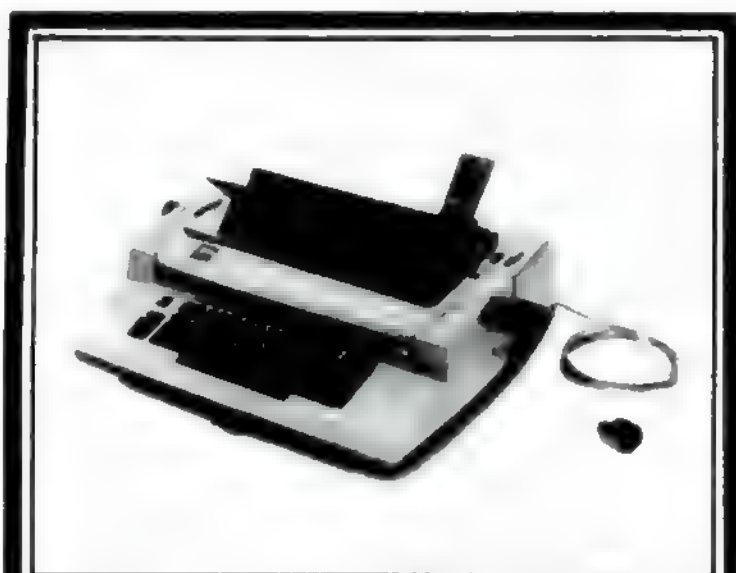
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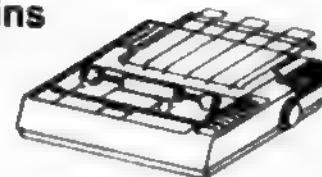
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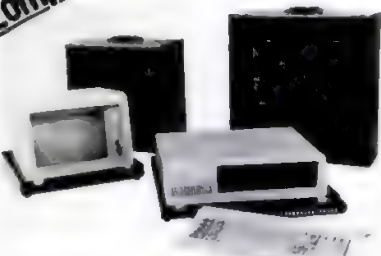
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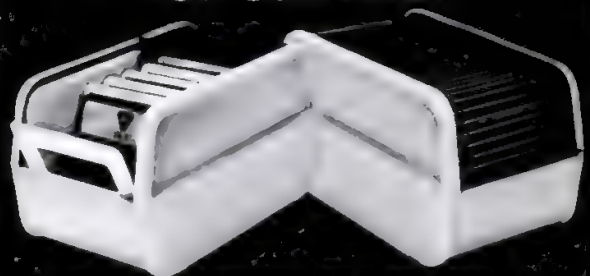
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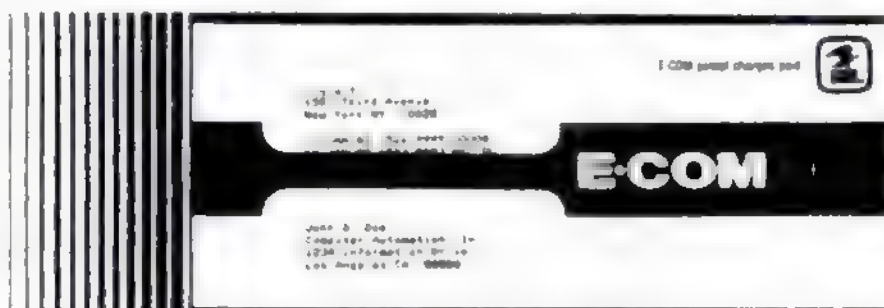


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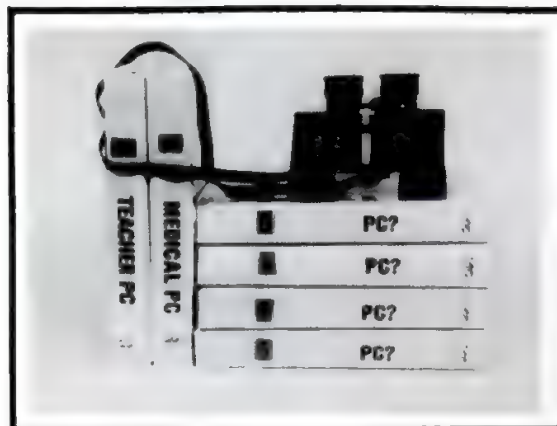


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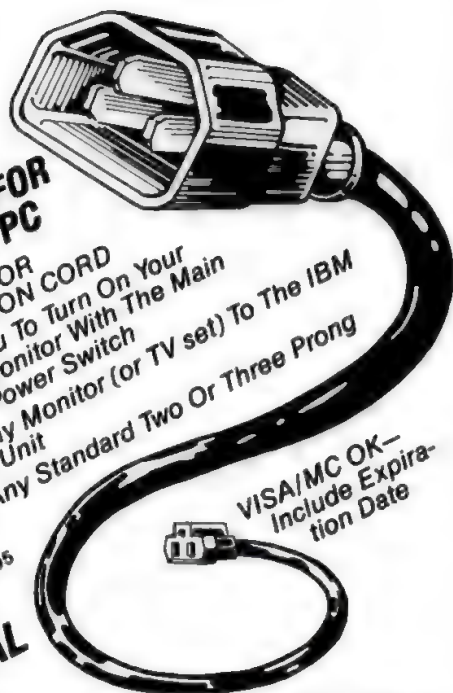
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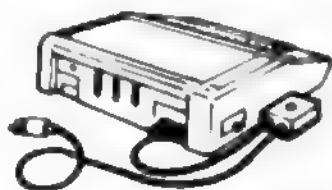
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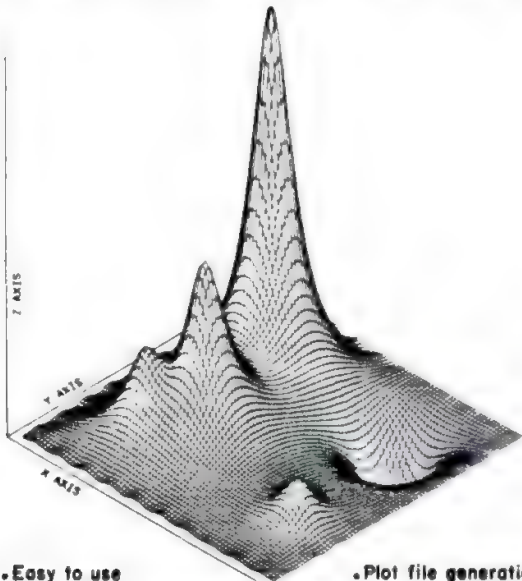
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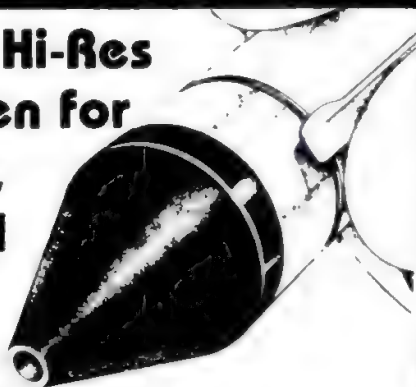
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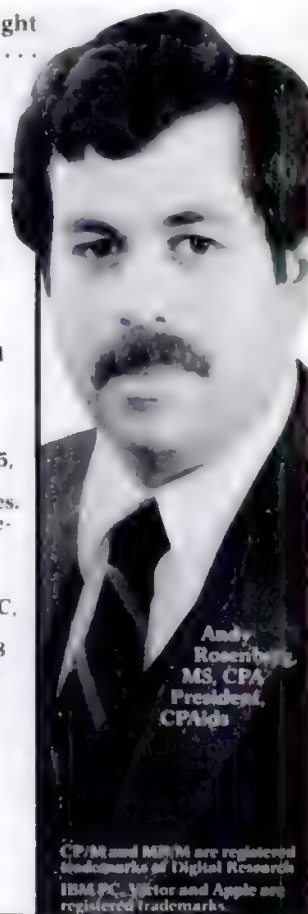
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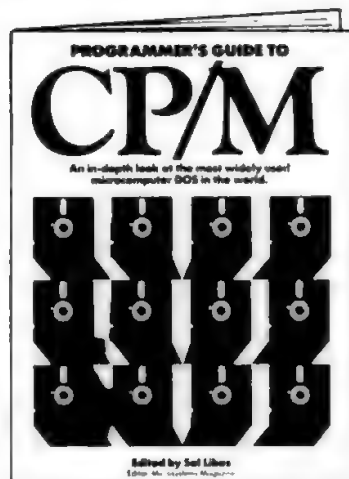
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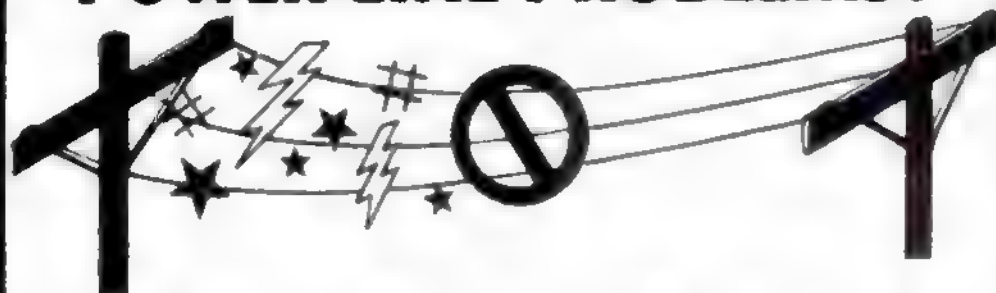
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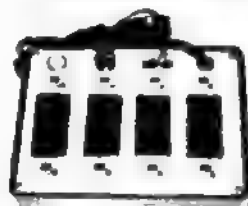
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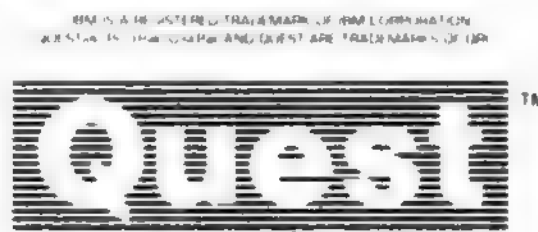
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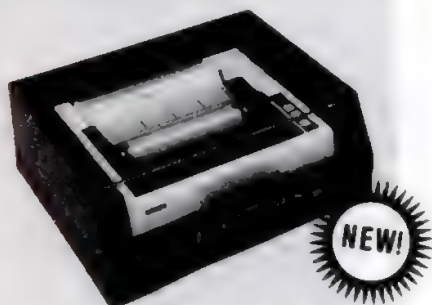
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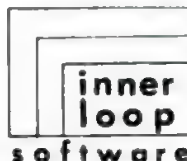
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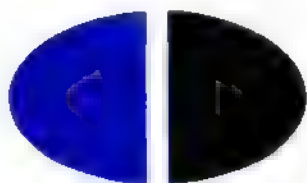
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As the evolution of undedicated word processors continues apace, at least one program derives its inspiration from the past—and its enhancements from the present.

The Simplicity of Qwerty

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line by 79 character text display capacity; the text is centered on the screen. Although there is no horizontal scrolling, a line can be as wide as 150 characters. (In this case, the line of text above the cursor—or “typehead” as Qwerty calls it—wraps around and is entirely displayed. A one-line ruler at the bottom provides mar-

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You want a word processor for your PC. You don't want one that's too complex because you probably won't need all the features of an expensive, top-of-the-line program. You don't want to be unnecessarily burdened by extraneous procedures and commands. But neither do you want a bare-bones word processor. The solution? Only you can really decide, but among the middle-range word processors you should consider is Qwerty.

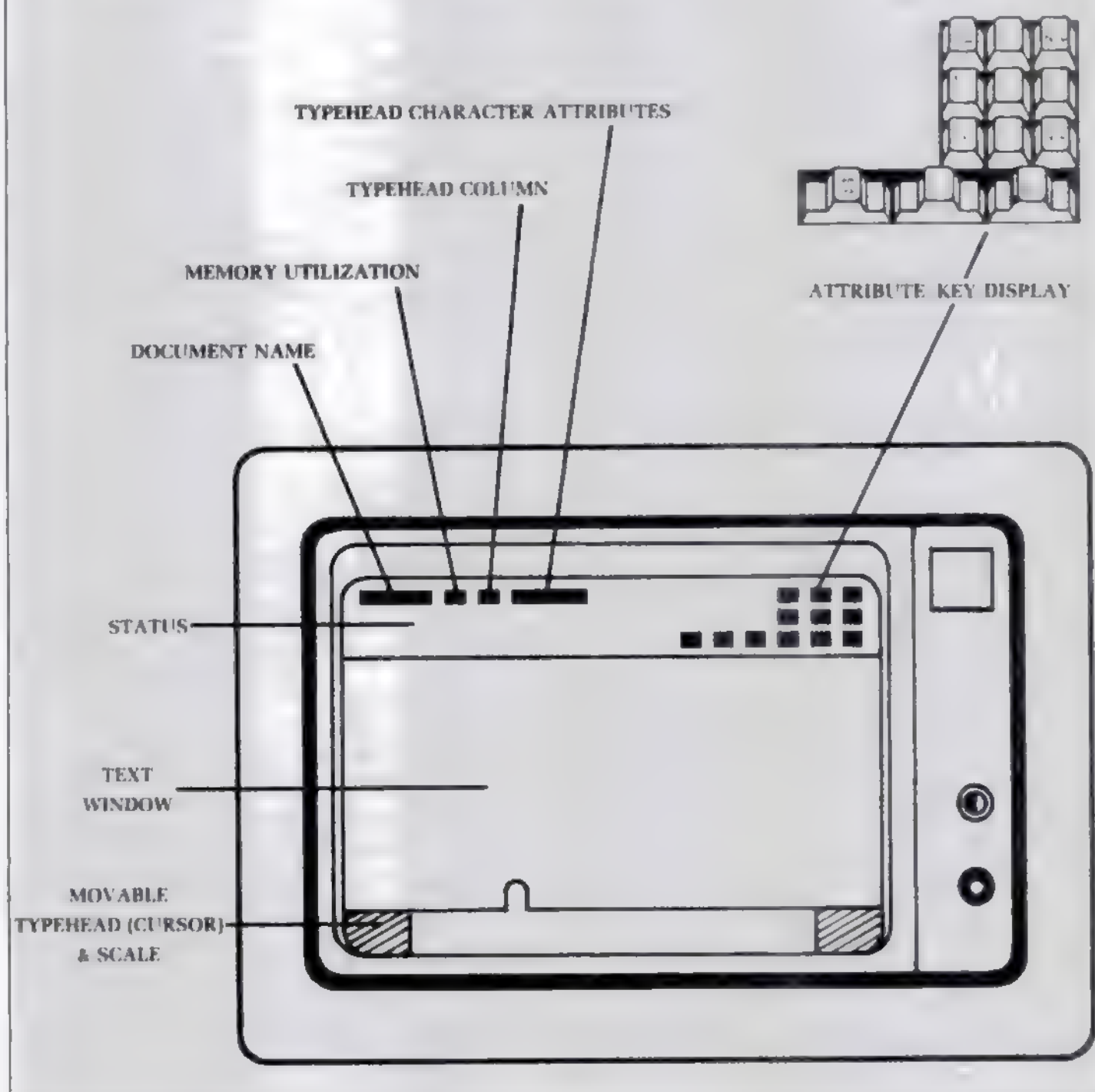
The system requirements for Qwerty are simple: 64K RAM and one disk drive. It loads into memory in its entirety, leaving room for the equivalent of ten pages of normal text. An additional 64K renders the program more convenient, but the extra memory is not necessary.

A word of caution, however. The version of Qwerty tested for this review would not run on the new PC-XT, nor on the Compaq or Columbia clones. This is probably because it uses the original PC's ROM coding. If you are considering Qwerty for a machine other than the PC, you should check for updates to the program.

Screen Display

The screen is well-laid out, with a 20

Figure 1: The Edit Display shows the scale and movable typehead (cursor) at the bottom of the screen and the status line display at the top



gin and tab information. The top window is a three-line status display. This shows the name of the document, the percentage of memory used, and the cursor location. It also gives a constant picture of the numeric keypad "attribute keys," which are used to assign print attributes such as underlining. (See Figure 1.)

When you start up Qwerty, a menu of five choices appears. If you choose to change or print a document, you are asked for the name of the document. If you choose to create a new document, you go directly to the edit display; no name is required. The other menu choices are to

list the Qwerty files or to return to DOS. The Escape key returns you to the menu.

YOU NEVER have to reformat a document.

Qwerty, as you might guess from the name, is designed to emulate a typewriter.

On the main edit display, the cursor rests at the bottom of the screen; it looks like the type-guide on a typewriter, except that as it moves across the screen, the new text appears directly above it. As you type, the cursor moves to the right; at the end of the line, the "paper" moves up and the cursor moves back to the left margin.

Function Keys

A very distinct feature of the Qwerty system is the use of the function keys (labeled F1 to F10 on the left of the keyboard). The Function Aid Card (see Figure 2) serves as a graphic reminder. You can attach it to the keyboard next to the keys.

Qwerty moves through the text by character, word, or line. Function keys F1 to F6 are for cursor movement by character (left and right); F3 and F4 are for movement by word; and F5 and F6 are for movement by line. To delete in any amount, you use the shift key in conjunction with F2, F4, and F6.

You're in the middle of a job and you need help. No need to dig through your manual or strain your memory; simply shift to F1, F3, or F5. F1 will tell you what your established margins, tab stops, and paragraph indents are. F3 will display the syntax of commonly used format lines. F5 displays keys used in cut-and-paste operations.

You can scroll up or down one line, without moving the cursor, with F7 and F8. When you don't want to scroll up but

BLOCKS CAN be marked, moved, and copied with two-stroke commands.

need to peek at the two lines below the cursor, a shifted F7 does just that.

Search (forward and backward) is accomplished with a fourth pair of function keys, F9 and F10. Search and replace uses shifted F9 and F10. The search function can be used to scroll quickly through the entire text with as few as three keystrokes by "searching" for a character (like the curly bracket symbol) that isn't in the

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document. The Escape key can be used to stop the scroll wherever you wish.

The special uses of the function keys become intuitive very quickly; I found the function key reference card unnecessary after just a few hours of use.

File Handling

Blocks can be marked, moved, and copied with two-stroke commands. The block is stored in a temporary file on disk;

board.

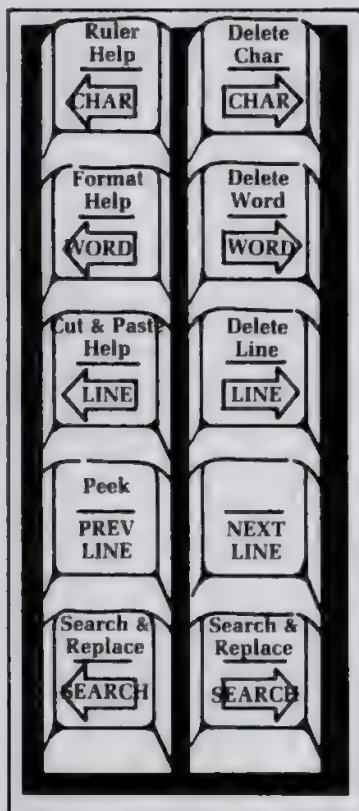
Qwerty does not force you to name a new file before you have typed it. At the end of an edit, Qwerty asks you if you want to save the document to disk; you name it at that time. This gives you the choice of whether or not to name a file at all, as well as the freedom to establish a logical naming sequence for a group of documents. Also, because you are not required to save to disk when you end an edit, you can print the document and, if any adjustments remain to be made, return to it with two keystrokes. Qwerty recognizes only files with the extension

.DOC. For many, this will be no problem, but I found it inconvenient, since I rely

***THE ONE
printing feature I missed
was automatic headers
and footers.***

quite a bit on the file name extension to sort directories.

Figure 2: The Function Aid Card reminds the user of the particular uses of the function keys (F1 to F10).



it exists only until the next block move writes over it. You can execute moves within the existing text as well as to and from a disk file. This is not the most flexible method, but it is workable. One way to speed up this disk-dependent block move is to use an electronic disk program (which sets up a portion of RAM as an additional disk drive). Unfortunately, Qwerty would not function with the electronic disk that comes with the AFT

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No file utilities, such as rename and copy, are included. This means that you must end, save to disk, and exit (four keystrokes). It's a bit inconvenient, and though the manual offers explanations of the DOS commands, new users will probably need help.

Another feature of Qwerty is the constant reformatting that occurs whenever new text is inserted. You never have to

reformat a document.

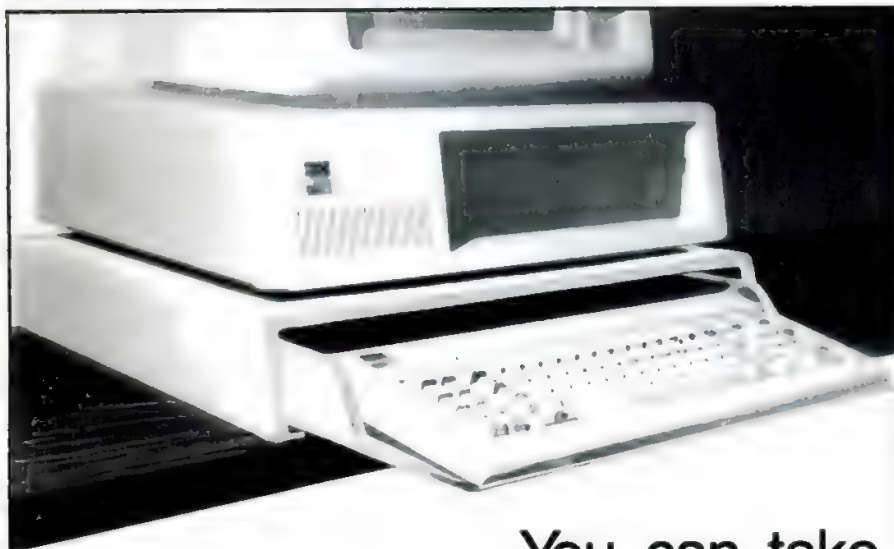
Printing

When you purchase Qwerty, you specify two printers for which you want it configured. Qwerty specifically supports the IBM dot matrix, the NEC 3530/50, the Epson MX-80 and MX-100, the new Epson FX-80 and FX-100, and the Smith-Corona

TP1. Qwerty worked perfectly with my Epson MX-80. The general teletype category handles other parallel and serial printers. The teletype configuration does not allow all of Qwerty's features to be implemented—proportional spacing, for instance, is lacking—but the program author promises that the general printer configuration will provide a working interface. The printers that are supported are well-supported indeed; for example, the NEC printer configurations include commands to control two paper hoppers.

The format line (like the WordStar dot commands) consists of print-related instructions. These are easy to remember (*2S for double spacing and *BN for begin numbering). A Help screen reminds you of the commands for turning justification on and off; changing pitch settings, line sizes, form, and page size; and pagination, including intelligent page breaks, continuous printing of linked documents, and optional automatic page numbering. The one printing feature I missed was automatic headers and footers, which allow you to name, as well as number, each page.

The numeric keypad controls print attributes. Qwerty allows you to assign print attributes both during and after text entry. To underline, simply hit the underline key and the line key and you've got on-screen underlining. Boldface is reflected on the screen; double underlining, sub- and super-script, and overstrike are



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real tabs (not inserted spaces). This eliminates the problem of text being pulled to the left through a tab when text is deleted.

You justify text with a format line. Qwerty provides semi-automatic hyphenation: You can protect spaces so that

TO UNDERLINE,
simply hit the underline
key and the line key and
you've got on-screen
underlining.

words will stay together and suggest syllable breaks for long words.

Best of all, these print features are integrated into Qwerty's editing process.

Easy to Use, Easy to Try

Even first-time users will have no difficulty installing DOS and specifying the appropriate printer configuration. The 90-page Qwerty manual is a model of appropriate documentation. It is neither a telephone book-sized bible of technical reference nor a long tutorial calling for jigsaw-puzzle patience. The beginner can easily manage the 15 short lessons. Those with experience can use the index to find answers to specific questions, the glossary to find definitions of Qwerty terms, and the appendices to find quick explanations of the function keys, shifted function keys, and printing. Users can call up Help screens in the status display area at the top of the screen with three shifted function keys. These provide thumbnail reference to the ruler line, the format line, and line and block moves.

If you want to try it before you buy it, Qwerty has a 60-day no-risk trial plan that gives you a chance to try it out for a \$20 handling fee. Qwerty is also protected; a \$15 backup can be ordered from the publishers after they receive the registration.

Final Word—or Two

I was a little skeptical when I first saw the brief menu display. But in the time I've used Qwerty I've found the menu to be very efficient, and I liked the use of the

same keys for cursor movement and text deletion. But I was most impressed by the ease with which formatting features were integrated into the editing process. It's great to hit three keys and have a line of underlined boldface text appear on the screen.

Any administrative word processing operation would appreciate Qwerty. Because of its excellent manual and logical integration of printing, file-handling, and editing, this package is a good choice for personal or small-office use. Its foremost advantage is that it is easy to learn and use. This ease of use results from the well-

thought out choice of features. For, while other packages have many more features, leading to inevitable confusion, Qwerty handles large jobs simply and well. In fact, I used Qwerty to write this article.

I have used half-a-dozen word processing packages, and I found that I was using 90 percent of Qwerty's functions after just a couple hours of use. In contrast, I only use 20 to 40 percent of an overly-endowed word processor's functions. If you don't need the more esoteric features or don't have one of the fully-supported printers, you would do well to give Qwerty a trial. /PC

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PC MAGAZINE 401 APRIL 1993

The Texas company that produced the highly successful PC Introductory Set, hopes to capture the attention of computer game fans with PC Arcade.

Fun and Games From FriendlySoft

FriendlyWare PC Arcade

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(817) 277-9378

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Requires: Color or monochrome monitor.

CIRCLE 578 ON READER SERVICE CARD

Back in 1982, a Texas pizza franchiser named Mike Yaw took a ragtag group of programmers and marketing specialists and produced one of the PC's biggest software success stories—a three-disk package of beginner's programs called the FriendlyWare PC Introductory Set. The first month it hit the computer stores, FriendlyWare elbowed its way onto the best seller list.

Now, FriendlySoft hopes to eclipse its earlier success with a new all-game package called FriendlyWare PC Arcade. The company claims that the initial two production runs were snapped up even before the first copy was shipped.

A Stroke of Genius

There were several reasons why FriendlySoft's first effort—a grab bag of

software from a fledgling organization—was so successful. For one thing, the name was a stroke of genius. Novice PC users were tearing out their hair over some of the poorly documented, slapdash software that had been rushed onto the shelves soon after the PC was introduced. FriendlyWare came in a tidy padded standard (IBM) size binder and was typeset on glossy paper. Instructions were clear, concise, well-written, and even amusing. They were accompanied by interesting and understandable sections on such topics as the development and operation of computers, differences among various computer languages, and the intricacies of file structure. They even stepped the user line-by-line through one of the BASIC programs in the package.

"But seriously, folks . . ."

The Introductory Set broke the ice for new users by opening with a screen informing them that they would have to answer two questions before proceeding: "What is the total square footage of Idaho?" and "How many nickels are there in \$1,387,865?" Then, after a few seconds, the screen impatiently flashed the message "WAITING WAITING WAITING." It

immediately apologized for the joke and jumped into an attractive menu. Other hierarchical menus branched off from the main one. Each allowed the user to move easily from one part of the disk to another by using single keystrokes. The screens were well designed, containing a good deal of information on what else was available and on how to access other menus—all in all, a top-notch job.

The first disk provided a fairly comprehensive introduction to computers—one of the best available at the time. It also offered a slate of games and a hearing test. The second disk contained other games, and included a biorhythm program and a drawing utility that the developers had used themselves to create ASCII character images for the FriendlyWare package. There were several home and business programs on the third disk, one of which—the checkbook register—received rave reviews.

Best of all, the programs ran equally well on both color and monochrome systems, and sold for only \$49.95. Reviewers chuckled that the checkbook balancer by itself was worth more than that, and troweled on praise so heavily you'd think these fellows from Texas were selling dollar

bills for a quarter.

PC owners flocked to this package because it was indeed a good value, as well as something even novices could operate. It didn't hurt that there really wasn't any competition. Dealers liked the software because they could use it to demonstrate the PC. As the FriendlySoft dealer's brochure noted, about the only thing prospective purchasers could do with IBM's own demo was "dodge the donkey—not real exciting stuff." Also dealers could easily afford to give the set away as an incentive to buy a PC.

Less Is More

FriendlySoft's second package is devoted exclusively to arcade-type games. It also sells for \$49.95, but contains far fewer programs. Even so, FriendlySoft's PC Arcade will probably do very well.

First, there is a good chance that most of the purchasers of the first set are satisfied customers who will come back for more. The price is still fairly low; about the only software you can find these days for under \$50 are one-to-a-disk games, modest utilities such as cross referencers, and such atypical promotions as Bruce & James WordVision. As with the Introductory Set, the FriendlyWare PC Arcade menus are a pleasure to breeze through. And it will work well on color or monochrome systems.

Poor Facsimiles

The real strength of PC Arcade, however, is that it contains versions of some of today's most popular home and arcade games, adapted for the PC. For 50 bucks, you get primitive versions of Lunar Lander, Breakout, Donkey Kong, Centipede, Defender, Berserk, and Frogger, plus still another edition of Pacman. You'll also receive a shoot-em-up game similar to Attack, and a horse racing game called PC Derby.

The individual programs have been translated to the PC with varying degrees of success. Donkey Kong, for instance, allows three levels of play and offers most of the features of the coin-operated model. But the designers were limited to ASCII characters for all their images. As a result, Kong resembles a second-grader's stick-figure conception of a robot. Your on-screen ladder-climber is the ASCII smiling face, as is the girl you're trying to rescue. The hammer you use to beat off the tum-

bling coconuts is a truncated arrow. The other games are similarly constructed; the animals dashing for the wire in the horse race resemble galloping cocker spaniels. Still, considering the fact that these images were made out of rectangular blocks, it's fairly amazing that they look like anything. Unfortunately, you don't do anything with the horse race; you just watch. The computer plays the game; you're supposed to bet on the results. To quote the manual:

"... any suggestions that the game is non-participatory goes right out the window about midway through the first race. Sit 5 or 6 otherwise normal adults down in

THE ANIMALS
dashing for the wire in
the horse race resemble
galloping cocker
spaniels.

front of PC Derby, let them each pick a horse, and start a race. Within 20 or 30 seconds they won't recognize each other. Some will be shouting 'C'mon Deuce!', some will be pounding the table, and some will literally be jumping up and down. Add a small bet to the action and you'd swear you were standing on the finish line at Churchill Downs." Swear that, and you'll soon be standing in the thorazine line at the laughing academy.

White On White

PC Arcade does contain some nice touches. The programs are written in assembly language, which makes them fast and flexible. The paddle in Brick Breaker, a game written in PC Parrot creator Tony Chumak, slides back and forth so smoothly you'll never put up with balky BASIC graphics again. The sound effects for this program, by the way, are excellent. The noises produced by most of the other nine games aren't.

The programs use color sparingly, and in some cases, not at all. On IBM's high-quality color monitor, Bug Blaster weaves a white centipede-like object across a white playing field, dodging white obstacles and white arrows that your white

shooter shoots. Color would definitely have helped here. The authors admit this subconsciously; the prose in the manual warns that the "slithering crawling bugs" are "disgusting" and "look bad." True enough. The manual boasts of FriendlySoft's reputation as the text mode experts. They're all right, but let's not get carried away.

Mustard On Your Hub Ring

From cover to cover, the manual is similarly effusive and cute—and unpolished. It speaks of "die hards" and "it's familiar ball" and "it's own set of obstacles" and rabbits "laying about halfway across America's roads" and a river that is "no piece of cake either" and the amount of rocket fuel left "at touch down" and "learning how to" fly successfully. No, this was not translated from Japanese. Worse, the manual writers misspelled the name of the package at one point as "PC ARACDE," and even misspelled part of the name of the company on the title page as "THE FREINDLY FAMILY ..." This doesn't detract from the performance of the programs themselves, but you'd think they'd at least get their own name right on the first page.

The disk uses its own operating system. It boots automatically, and won't let you make copies. The company obviously felt that the first set of disks, which were not protected, was becoming a sort of unintended Freeware. One advantage is that you don't have to worry about putting DOS or BASICA on the disk. If you do put anything else on it, such as a greasy thumbprint, a permanent magnet, or "a staple through the media or mustard on the hub ring," FriendlySoft will replace it within 48 hours of receipt of the original.

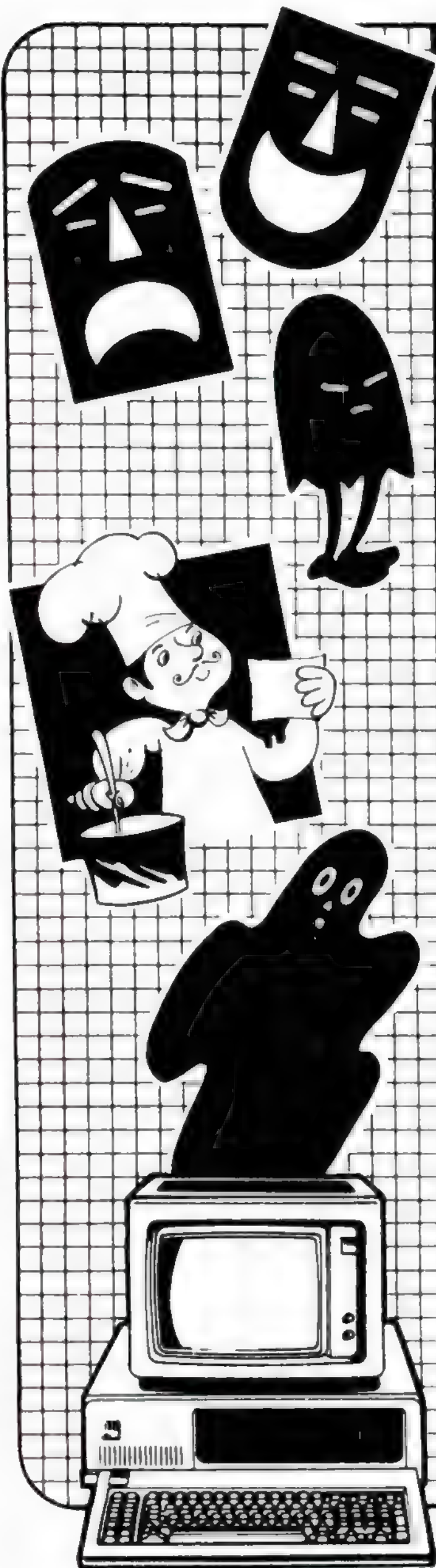
In addition, FriendlySoft offers a 24-hour hotline (your dime, not theirs) so that confused users can get help. In fact, if you believe the literature, after-hours calls are forwarded to the home of a programmer or a staff member. It is true that programmers keep odd hours, but do you really want to wake up someone in Texas at 3:30 in the morning because your gorilla won't jump?

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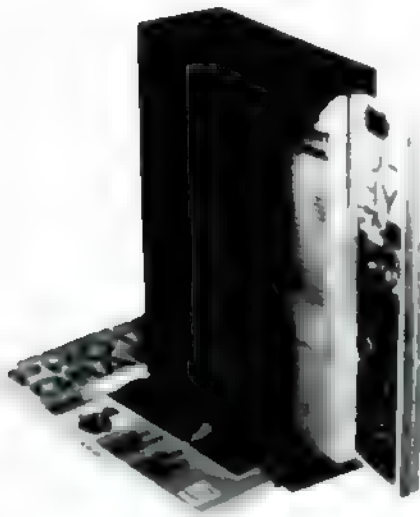
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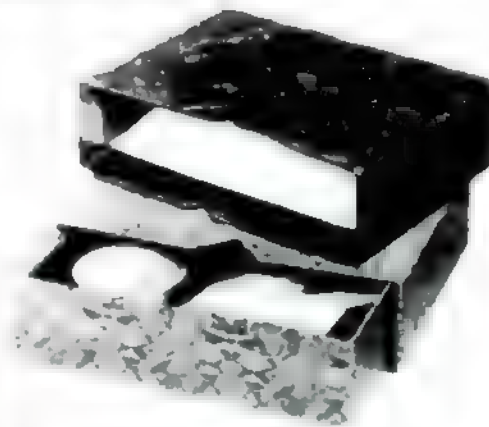
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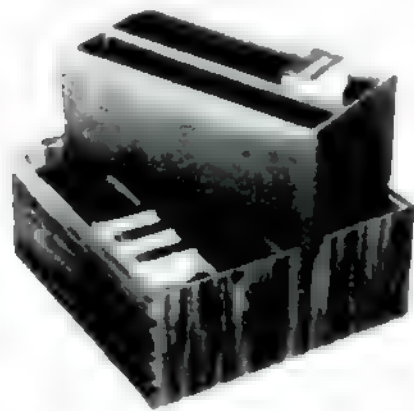
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priate setup questions. If you don't have a color graphics adapter, it will skip this setup entirely. If you have a game adapter card, the program will ask if you have a joystick attached and will calibrate it if you do. All of the games except Eagle Lander can handle a joystick, and you can use additional diagonal cursor control keys (7,9,1, and 3) in some of them.

When the Cat's Away

The program also uses several function keys. F10 lets you pause at any point, exit prematurely if you'd like, and return to the main menu. The other two function keys allow workers to play in their offices surreptitiously. F9 toggles the sound on and off; and F1 activates a feature sure to become popular. In the middle of any game, if you hit that key, the game disappears in a flash and is replaced by an innocent-looking bar chart. When the coast is clear, tap F1 again and you're back at the frog pond or deep in space zapping everything in sight. The manual calls this the "boss is coming key." And people wonder why American workers are not as productive as workers elsewhere.

Practice Makes Perfect

A few years back, Pong was state of the art, and everyone marveled at how you could actually play a game on a little computer. This package is the Pong of tomorrow. FriendlySoft did an excellent marketing job, but only a serviceable programming one. Still, its graphics do work on the monochrome screen and the disk is very easy to operate. PC users and dealers will probably flock to it and spend joyous hours with it. But a few years down the road, we'll look at this in disbelief: "They called that graphics? They played primitive games like that for hours on end? IBM sold monochrome monitors?"

PC Arcade is far from perfect. But it is friendly as they come, and a decent value. If you have a monochrome screen only and if you think of a dollar bill as four chances to chomp Ms. Pacman, you'll love it. But if you're waiting for rapid, seamless animation in dozens of colors, keep waiting. The 24-hour hotline and the lifetime guarantee are nice touches, although a copyable disk would have been preferable. The price is not too outrageous. FriendlySoft's motto is "Great software. Great prices. Great support." Well, two out of three isn't bad.

/PC

The Spelling Bee Is Over

Listen. We're going to let you in on an industry secret: It's not hard to make a good spelling checker.

You see, although spelling checking is new for microcomputers, it's been around on big computers for years. And when you get past all the talk, most spelling checkers work the same way. They compare what you've written with a dictionary—and report the errors.

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The hardest part of a spelling checker to make is the dictionary. It's hard to pick the right words—and spell every one of them perfectly. That's why some popular spelling checkers don't even contain real dictionaries. They use formulas called "hash tables." Which make a hash out of your spelling some of the time.

Other spelling checkers "borrow" their words from printed dictionaries—or copy them from old word lists. Or give a programmer who can't spell "programmer" a chance to write his first dictionary. And as though all this wasn't bad enough, a lot of these

companies want to charge you \$100, or \$200 or even \$300!

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Version 1 - Requires color board

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Understanding Warranties

Following the purchase of an IBM PC for our law office, I began to sift through the pile of instructions, documentation, spec sheets, and license agreements that IBM so thoughtfully provided. Eventually, beneath a mound of cardboard and shrink wrap, I found a small maroon notebook with the words "Guide to Operations" hot-stamped in white letters on the spine. Eager to learn more, I opened the notebook. On the first page was an ominous-looking document entitled "LIMITED WARRANTY."

Unimpressed, I did what most others have done before me. I quickly turned the page and proceeded to read up on more cheerful topics such as DOS, printer configuration, and disk drives. Against all odds, I had my PC up and running within an hour.

I imagine that first experiences with the IBM PC and its documentation are, like mine, common occurrences. Usually, if one simply follows directions, one's new electronic tool will live up to expectations. However, what happens when

something goes wrong? As more consumers buy personal computers, there will inevitably be an increasing number who were sold the wrong product, faulty products, or perfectly good products that aren't compatible with each other. What rights do these people have?

Limited Warranties

Computers are subject to many of the same warranty and consumer protection laws that cover more familiar items such as televisions and toasters. If you are unhappy with some part of a computer purchase, the first thing you should do is give the seller an opportunity to remedy the problem.

IBM's Limited Warranty is typical of warranties provided by computer manufacturers. Some companies warrant their products for a year or more (rather than IBM's 90 days), but the basic terms of the documents are similar. The IBM warranty requires that an unhappy consumer bring his sick PC to IBM or an IBM-authorized dealer. IBM promises to repair or replace

the product if it is found not to be in good working order for a period of 90 days following the purchase. By making this promise, IBM is offering what is known as a limited "express warranty."

The Magnuson-Moss Act (15 USC 2301), a federal consumer protection law, applies to personal computers (and other consumer items) even when they are used for business purposes. Certain express consumer warranties that don't meet the "Full Warranty" requirements of Magnuson-Moss are automatically termed "Limited Warranties." The Act and its Federal Trade Commission (FTC) regulations are complex; if you have suffered substantial damages because of faulty computer hardware and/or software, consult a knowledgeable lawyer.

Usually a case of hardware failure is relatively easy to remedy. But if the problem is more involved than hardware failure, you may have difficulty obtaining satisfaction from your dealer for a number of reasons. Suppose, for example, you bought a mailing list program with the

computer. After investing months inputting a mailing list, you decide to switch over to hard disk. At that point you find out that your program will not run on a hard disk. If something like this happens, here are some things to consider.

Invisible Warranties

Were there any warranties other than those expressly provided in the limited warranty? This isn't as easy to answer as it may seem. Warranties come in different guises—many of which aren't even in writing. If you run into a situation where you are unhappy with your purchase, you should ask yourself, "How did I make the decision to buy this combination of hardware and software?" If the answer is that you did the research and decided on your own, you may have nowhere to turn unless the system is simply not "merchantable." But if you described your needs and the dealer made a recommendation, you may have received much more than a useful tip.

You may have received a warranty known as the "Uniform Commercial Code (UCC) warranty of fitness for a particular purpose." This is an implied warranty that arises when a seller recommends a product to suit the needs of a buyer. If the product does not justify the seller's recommendation, the buyer has certain legal rights. These include the option to recover damages resulting from having relied on the recommendation, as well as the difference between the cost of an adequate system and the one that was recommended.

***IF THE PRODUCT
does not justify the
seller's recommendation,
the buyer has certain
legal rights.***

Naturally, recovering from a recalcitrant seller will not necessarily be everyone's idea of a good time. You may have to go to court (or Small Claims Court). The UCC, incidentally, unlike the federal Magnuson-Moss Act, is a series of individually adopted state laws. These laws vary somewhat from state to state.

The seller may argue that the warranty (if there is one) was disclaimed. If you read the fine print on the "limited warranty," rather than quickly turning the page, as I did, you will see IBM's attempt to disclaim the implied warranty of fitness for a particular purpose. A chapter on "Legal Care for Your Software" tells software publishers how to disclaim warranties. The "implied warranty of fitness" comes into play if the seller recommends a specific hardware/software combination for a customer's particular needs. In such cases, the consumer is said to "rely" on the seller's expertise.

If, for example, you explain to a salesperson that you need a computer and program to help you calculate construction costs, an implied warranty is created if the salesperson says something to the effect of "This package will do the job for you."

Whether a disclaimer of the implied warranty of fitness will be effective in shielding the seller depends on the facts of each case and the sympathies of the court. Frequently, these disclaimers are found to be invalid. If the disclaimer was not easily readable at the time of the sale, but was packed away in the sealed carton, it will often be voided by a court. This is why IBM and other savvy vendors shrink-wrap the disclaimer (facing out) to the slipcover of its software. There are several other possible UCC warranties. One is known as the "implied warranty of merchantability." Again, this is not a written warranty. It comes with every sale of goods and is valid unless it is properly disclaimed. The warranty basically provides that an item (such as a computer) will perform the way it should and the way that other similar items perform.

Express Warranties

Other warranties fall into the category of "express warranties." These needn't necessarily be in writing. An unwritten express warranty may be created if the computer dealer gives you a demonstration of a computer and you purchase one based on the demo. It is not uncommon, for example, for a salesperson to demonstrate a program on a machine that has more memory than the one contemplated by the buyer. If this fact is not disclosed to the buyer who subsequently purchases the system, he may be entitled to the remedies discussed above if the system does not perform as demonstrated.

An example of an express written warranty occurs when a purchase is made on the basis of published specifications. If, for instance, the specifications state that the computer comes with 320K drives, but it is actually equipped with 160K drives, an express warranty will have been

CONSUMERS
*should proceed on the
assumption that
software is capable of
being warranted.*

breached. You will then be entitled to the larger capacity drives and/or money damages.

Pondering the Intangibles

In many respects, computer warranties are like other product warranties, but there are some unsettled (and unsettling) questions. One of these is, "To what extent is software governed by warranties?" Many lawyers argue that software is an "intangible" and not a "good." Generally, warranties don't apply to intangibles. Others counter by claiming that software, especially microcomputer programs, are products or goods. Certainly IBM has done its best to make its software look substantial and as much like a "good" as possible. IBM even refers to its programs as "products." Finally, even if software is not a "good" when sold by itself, when sold in conjunction with a computer, the overall package of hardware and software is a "good."

It will be some time before case law develops sufficiently to help lawyers accurately predict when a disclaimer will serve its purpose and when a court will throw it out. In the meantime, consumers should proceed on the assumption that software is capable of being warranted. Taking this position can't hurt and you stand a good chance of prevailing, especially if the software and hardware were bought from the same seller. /PC

Paul Remer and Daniel Remer are partners in the Mountain View, California law firm of Remer, Remer, and Dunaway.

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The fight against computer crime in business is hindered by management complacency and widely held view that equates data theft with pranksterism.

Understanding Computer Crime

Your business computer, be it an IBM PC, System 34 or 4300, is very much like a cash register—a tool to tally up sales and store the proceeds. But also like a cash register, it can be robbed by crooks, and it is subject to disgruntled employees dipping into the till. But unlike a cash register, a computer is a powerful tool for committing much more serious crimes.

Technological Robin Hoods?

Computer security experts like Donn Parker of SRI have been waving the red flag about computer crime for years. Parker calls the increase of computer crime "epidemic." Unfortunately, the general public is apt to view computer crimes as cute stunts pulled off by a clever bunch of technological Robin Hoods.

The media publicizes such crimes as "malicious mischief." For example, two Yale students used a personal computer to tap into the university computer. They changed grades, created dummy accounts, and diddled around with various files. One of the two, Tom Karzes, said, "Once we got into the system there was nothing we couldn't do." Publically, the administration was quite upset, but privately one faculty member said, "It harmed no one."

More recently, two Chicago-area teenagers used a home computer to invade the data processing system at DePaul University, then threatened to shut down the system unless it handed over a program they wanted. Although DePaul called in the police, investigator Douglas Ellis said,

"They did it because everyone said it couldn't be done."

Going for the Jugular

Suppose these youthful "pranksters" had decided to tap into one of the four major electronic funds transfer (EFT) systems—FEDWIRE, CHIPS, BANKWIRE or SWIFT. The four move about \$400 billion a day domestically and about \$600 billion internationally. William Moroney, president of the EFT Association, maintains that the EFT systems are "quite secure" but also admits that they have "windows of vulnerability that shouldn't exist, such as sloppy internal practices and technical shortcuts."

Moroney goes on to observe, "When you're talking about moving billions of dollars around the country, and making money depends on your ability to move it in minutes instead of hours, you're talking about millions of dollars that can be earned simply by speed. That speed can be slowed down by too much security."

Anyone who wants to make a system secure must weigh the cost of security against the risk of exposure. As Moroney says, "If you spend \$1 million to protect \$100, that's not security, it's waste."

So what can you do to protect your computer? The approaches fall into four major areas: attitude, technical security, auditing, and people security.

Attitude

The attitude held by the majority of businessmen today is that it "can't happen

here." They have had assurances by their computer vendor that the system is secure. They "know" that their employees are happy, well-paid, and honest. Although the various equal opportunity acts prevent employers from asking prospective employees about criminal records or exchanging data about employees, most businessmen are unwilling to believe that they could possibly hire a criminal.

Data processing managers frequently feel secure because of the safeguards and security procedures that have been instituted. However, this is what Donn Parker calls "the Maginot Line syndrome." He explains, "The bad guy is not looking for where you do have controls; he's looking for where you don't have them. He's going to end-run your system every time." Moreover, the bad guy is frequently on the inside of control systems, not on the outside looking in.

An attitude commonly shared by programmers and people in the data processing department is, "Hassle me not with these security procedures." These attitudes lead to adhesive tape across door jams to prevent locks from catching, not signing off during a coffee break or lunch, and similar shortcuts.

As long as attitudes of complacency and hassle-me-not continue to prevail, a company might as well leave the cash drawer on the register wide open.

Technical System Security

Minimally, a computer system should

have controls that make the enemy work harder than the gain is worth. These controls include security kernels (a "software lock" that allows access only to specific, authorized terminals and users), exception reports (an internal system in which the computer flags any unusual transaction), logging cutoffs (a system that prevents remote computers from "spinning the dial" on the password lock until it finds one that works) and encryption codes (on sensitive local data in storage as well as on data that are transmitted).

Auditing

Most companies audit their financial transactions from the standpoint of dollars but not number of transactions. However, Brant Allen found in a study of computer frauds that nearly 70 percent involved adding or deleting transactions to accounts payable and payroll files that caused payments to be made to fictitious companies or nonexistent employees.

Generally, perpetrators of computer frauds are careful to make sure that the dollar amounts balance throughout. It is

more difficult, however, to cover up additional transactions. Hence, these also should be audited to provide an additional measure of control.

People Security

People security is by far the most difficult aspect of controlling computer crime. Obviously, one level of people security is military-like clearance systems with stringent investigations into the backgrounds of computer personnel.

A second level involves divided duties, responsibilities, and authorizations so that no one has access to everything and, even if he did, he wouldn't have a clear enough picture of the total system to do any serious damage.

But as we've seen, outsiders are able to penetrate supposedly secure systems with remarkable ease. Where do they get their information? The best source is computer clubs and electronic bulletin boards. Modern computer freaks "publish" computer access codes and passwords on local electronic bulletin boards for all to see and

Another way of getting into systems is by going through the trash of the EDP room and remote terminal locations looking for passwords, file names, and access codes.

Still other more brazen hackers call EDP departments, represent themselves as programmers or consultants working for the mainframe manufacturer and request access information. Most of the time they get it—often without so much as a plausible explanation.

Finally, an excellent source of information is disgruntled employees or ex-employees.

How can you keep these foxes out of the chicken coop, particularly when the fox is young, bright, well-trained, and lacking in ethics when it comes to computers? As with other things in which people are the key, there are no easy answers.

However, perhaps the information above will point in the right direction for devising an approach that will meet your needs and the needs of your company.

/PC

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- **ScatterDIF** creates scatter diagrams for correlation analysis, including simple linear regressions. Two spreadsheet columns are compared for possible correlation and are expressed as a scatter diagram with a correlation coefficient.
- **Smart! Graphics Drawing System** touches up graphs with text and interactive graphics. Create flowcharts, maps, schematics, and dataflow diagrams with ease using 21 predefined shapes. Build shape tables for use with other BASICA programs. Joystick cursor control is supported but not required.

Graphs and generated screen images can be saved as disk files for re-editing and touchups. DIFMASTER™'s printer driver supports many popular printers, including the Epson family with Grafrax, & Okidata, and can be easily rewritten in BASICA to support others. (For faster screen dumps a machine-code utility like Frieze™ is recommended.)

Requires 64K, Color Graphics Adapter, BASICA

DIFMASTER™ \$79.95

User Guide only \$15



**STARSIDE
ENGINEERING**

PO Box 18306 • Rochester NY 14618 • (716) 461-1027



New On The Market

HARDWARE

PConnection

A plug-in telecommunications card with a direct connect modem, a real time clock, and an additional serial I/O port to increase the communications capabilities of the PC. All components are mounted on a single board with gold-plated edge connector fingers that plug into the PC.

The PConnection also provides autodial, touch tone or pulse dialing and autoanswer functions in both answer and originate modes. (List Price: \$375; modem available for \$279)

Microperipheral Corp.
2565 152nd. Ave. N.E.
Redmond, WA 98052
(206) 881-7544

CIRCLE 700 ON READER SERVICE CARD

Video Printer

A video film recording unit that produces 35mm slides or photographic prints of the user's video display. Features include automatic film advance and rewind and a port for previewing the image to be captured. (List Price: \$2,495)

Requires: Color board, 35mm film, ASA-64 Ektachrome. Computer-Mate, Inc.
1006 Hamshire Lane
Richardson, TX 75080
(800) 527-3643
(800) 442-4006 in Texas
(214) 669-2380 in Dallas

CIRCLE 656 ON READER SERVICE CARD

Multiple Adapter Interface (MAI)

A MAI board that provides memory extension, monochrome or color video and a printer adapter on a single plug-in module.

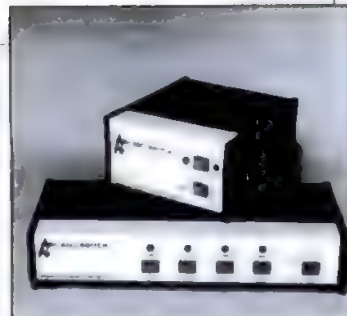
The board contains 128K bytes of RAM that is user allocated to the given function. A two position DIP switch is used to configure the board for monochrome video display or color graphics applications in the M/C (monochrome/color) switch position. In the second switch position, MM, the user allocates 96K bytes to user memory leaving 32K bytes for use in the video mode, or allocates the full 128K bytes to the video mode.

The MAI is capable of operating in any one of the four IBM compatible modes for color graphics: 40x25 alphanumeric, 80x25 alphanumeric, 320x200 four-color or 640x200 black and white.

In the modes, the MAI board's high density 128K of user memory allows the computer to store more data with better picture enhancement. (List Price: \$799)

Amdek Corporation
2201 Lively Blvd.
Elk Grove Village, IL 60007
(312) 364-1180
TWX: 25-4786

CIRCLE 630 ON READER SERVICE CARD



ASCII PC Switch, Advanced Systems Concepts, Inc.

ASCII PC Switch

A set of 22 switches that allow all RS-232C printers, plotters, terminals, and modems to be networked to the PC. Parallel switches that allow networking with the IBM printer are also included. The three variations of the unit are the APTA series, which allows one computer to interface with two peripherals; the API series, which allows four computers, modems, or terminals to share a common unit such as a letter quality printer; and the APO series, which allows a single port to select or poll one of four output devices.

Networking applications for this product line range from networking a letter quality printer to four PC's, to networking a modem to a multiple computer system. The input and output ports of the units can be controlled automatically by sending one of 128 user selectable ASCII codes. Each unit can be controlled from remote locations by terminals, modems, or computers. (List Price: Ranges from \$345 to \$569; discounts available)

Advanced Systems Concepts, Inc.

435 North Lake Ave.
Pasadena, CA 91101
(213) 793-8972

CIRCLE 660 ON READER SERVICE CARD

Multiple Adaptor Interface, Amdek Corporation



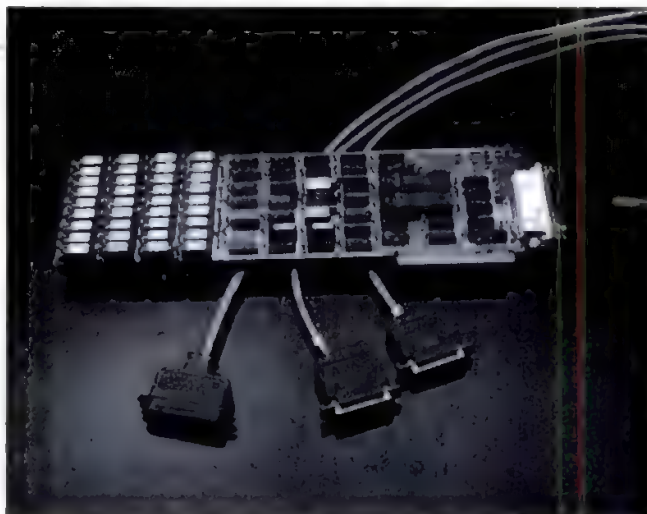
answerRAM

A multi-function RAM board designed for business and professional PC users. It has three I/O ports and is configurable with 64K, 128K, 192K, and 256K of additional RAM. Two of the ports are asynchronous, serial communications ports, and the third is a parallel printer port configured with a standard Centronics interface. Connectors are supplied for both serial and parallel interfaces, and an optional factory-built "3-into-1" cable is available that permits take-off of all three ports from a single heavy-duty 37-pin connector in the standard rear-expansion slot of the PC.

All memory is IBM compatible with full parity checking. The manufacturer supplies software for electronic-disk application and print spooling as well as a routine that permits the user to change the system default printer with a keyboard command. (List Price: 64K \$595; 128K \$716; 192K \$837; 256K \$958)

Anatron, Inc.
202 West Bennett St.
Saline, MI 48176
(800) 521-0521
(300) 429-2678

CIRCLE 651 ON READER
SERVICE CARD



answerRAM. Anatron, Inc.

Z8 BASIC System Controller Board

A small board containing a tiny BASIC interpreter, up to 6K RAM and EPROM memory, an RS-232 serial interface with switch-selectable baud rates, and 2 parallel ports. The board is fully-expandable to 124K and has been optimized for use as a dedicated controller. Connecting a CRT terminal allows immediate programming in BASIC or machine language, and programs can be transferred to 2732 EPROMs with optional EPROM programmer for auto-start application. (List Price: \$199)

The Micromint, Inc.
561 Willow Ave.
Cedarhurst, NY
(800) 645-3479

CIRCLE 588 ON READER
SERVICE CARD

Model 2216 ADC

An extremely fast analog-to-digital (ADC) converter that converts an analog voltage to a 16-bit digital number in less than 5 microseconds.

The 2216 consists of two piggy-back, high-quality, epoxy-filled, glass-etched circuit cards which, plugged together, form a single plug-in module. It can be used independently or with other analog modules to form a complete system. (List Price: \$1,500)
Tustin Electronics Company
1431 E. St. Andres's Place
Santa Ana, CA 92705
(714) 549-0391

CIRCLE 587 ON READER
SERVICE CARD

MicroTerm

A menu-driven smart terminal program with translation tables that allows the program to emulate any type of terminal hardware. Its dialing menu allows the user to auto dial any one of 10 preset numbers. Additional numbers may be kept in other configuration files and loaded in seconds. It supports most major brands of modems including auto dial in both command and pulse dial modes.

Spoiled printer output allows slower printers to stay on line. The program can operate at 1200 baud and in some cases, up to 9600 baud, without insertion of null characters. (List Price: \$79.95)

Requires: Available from manufacturer.

Micro-Systems Software Inc.
4301-18 Oak Circle
Boca Raton, FL 33431
(800) 327-8724
(305) 983-3390

CIRCLE 586 ON READER
SERVICE CARD

New on the Market does not review products, but reports information provided by the manufacturer. If you have a product you would like to have included in this section, send a brief description that includes applications, price, and system requirements to New on the Market, PC, One Park Ave., New York, New York 10016. Photographs and illustrations are run on a space-available basis.

New On The Market

AJ 1259-AD

An auto-dial/auto answer triple modem that is compatible with the Bell 212A and VA 3400 series modems at 1200 bits/s and with Bell 103/113 modem at 300 bits/s.

The modem eliminates the need for a telephone set on the data line. Terminal users can now dial direct from any associated terminal keyboard. They can also enter, store and automatically dial up to 10 telephone numbers through simple keyboard commands.

The unit is microprocessor-controlled and offers continuous self-test and comprehensive diagnostics features. When answering a call, it automatically selects the appropriate communication protocol and data rate. It also allows direct access to stored numbers and a simple write-over to change. (List Price: \$875; lease price, \$60 per month)

Anderson Jacobson, Inc.
521 Charcot Ave
San Jose, CA 95131

CIRCLE 566 ON READER SERVICE CARD

Winchester Disk Drives

An interface series of Winchester disk drive subsystems to provide up to 15.9 megabytes of formatted storage. Each disk drive subsystem includes the 5¼ inch Winchester drive, cabinet, power supply, cable, connector, I/O adapter, and software (JEL) for DOS 1.1.

The drives have a track density of 345 tracks per inch. Track-to-track access time is 2 milliseconds with an average access time of 85 milliseconds. A mean-time-between-failure of 10,000 hours at 100 percent duty cycles insures drive reliability.

Other features include a 512-byte full-sector buffer, a 32-bit ECC, and automatic interleaving capabilities. The disk system uses 175 watts power and offers a choice of AC operating voltages. (List Price: \$1,695 for 5.3 megabytes formatted storage; \$1,995 for 10.6; \$2,295 for 15.9)

Requires: Available from manufacturer.
Interface, Inc.
7630 Alabama Ave.
Canoga Park, CA 91304
(213) 341-7914

CIRCLE 574 ON READER SERVICE CARD

SOFTWARE

Financial Planner Release 220

A financial management program that interfaces with the dBASE II database management system.

The program provides users with a system for the construction of spreadsheet applications. The Release 220 can interface with external files. The dBASE II interface is called with a special command from either the Rules section or the interactive processor. The interface with external files is invoked by adding an arithmetic operator to the read and write statements. (List Price: Available from manufacturer)

Requires: Available from manufacturer.
Ashton-Tate
10150 W. Jefferson Blvd.
Culver City, CA 90230
(213) 204-5570

CIRCLE 624 ON READER SERVICE CARD

DEMO-DX

A self-teaching, self-demo disk for the Interactive Data Manager (IDM-X). It demonstrates how to create a simple data file, use most of the basic commands, and create several reports.

The package consists of a disk with instructions on the label. (List Price: \$9)
Requires: 64K, a monochrome display, dual disk drives.
Micro Architect Inc.
96 Dothan St.
Arlington, MA 02174
(617) 643-4713

CIRCLE 575 ON READER SERVICE CARD

WordPlus-PC

A fully-featured word processing system for the PC which is also compatible with the new PC-XT.

The program has been designed to be "keyboard specific" for the PC (and the XT) and takes advantage of each computer's capabilities, including the special function keys. It features a Color Coded Key Cap system to bypass the need for memorizing complicated codes. (List Price: \$395)
Requires: 64K, one disk drive, DOS, can be loaded onto hard disk.

Professional Software Inc.
51 Fremont St.
Needham, MA 02194
(800) 343-4074

CIRCLE 573 ON READER SERVICE CARD

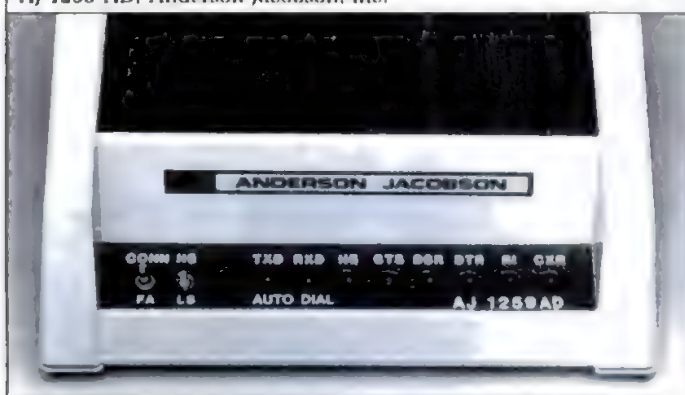
MIRACULOUS MENU MANAGER

A program that allows users to execute any function the operating system is capable of performing by pressing a single keystroke. The user has the choice of what functions are to be performed, what keys can perform the function, and what prompts to use. The program comes with a set of predefined functions to use or replace. (List Price: \$39.95)

Requires: 64K, one disk drive, 80-column display, PC-DOS.
The Computer Workshop Inc.
322 Sheldon Ave.
Houghton, MI 49931
(906) 482-8009

CIRCLE 628 ON READER SERVICE CARD

AJ 1259-AD, Anderson Jacobson, Inc.



ANNOUNCING!



MEDICAL RECORDS SYSTEM

SYSTEM FEATURES

PATIENT RECORDS

Patient Master

- Instant Access for Inquiry or Correction
- 8 Digit Alpha or Numeric ID Number
- Full Patient Data Including
 - Employer
 - Occupation
 - Referred By
 - Insurance Data
 - Receivables Ageing

Patient Activity

- Full History Maintained
- Accident Records Includes
 - Date of Accident
 - Date off Work
 - Date Returned to Work
 - Where Accident Happened
 - How Accident Happened
- Treatment Record Includes
 - Date of Visit
 - Diagnosis
 - Treatment
 - Charges
 - Condition Text
 - Comments Text
- Payment Records Include
 - Date
 - Amount
 - Source of Payment
 - Comments Text
 - Special Adjustments

PRACTICE INFORMATION

Centralized Customization of Practice Information
 Up to 999 Treatment Descriptions & Prices
 Up to 999 Insurance Co. Name & Address
 Up to 999 Diagnosis Codes
 Screen Prompting of Diagnosis Codes
 Interactive Inquiry/Correction/or Addition
 Printed Documentation of All Practice Information
 Monthly Practice Analysis

ACCOUNTS RECEIVABLE

Automatic Insurance Form Printing

- Medical
- Medicare
- General Insurance
- Workmans Comp

Patient Statements

- Window Addressing
- Full History or Open Item Detail
- Past Due Text (Redefinable)

Management Reports

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- Insurance Backlog Report
- Overdues Telephone List

Office Access

- Instant Status Inquiry
- Flexible Account Adjustments
- Daily Log Audit Trail
- Interactive Error Correction
- Patient Record Printout on Demand
- Alpha and/or Numeric Patient List

PRODUCT LINE

INFORET	\$ 35.00
DATAENTR 200	\$ 80.00
ISAM 100	\$ 90.00
ISAM 200	\$ 140.00
ISAM 300	\$ 190.00
MEDICAL REC SYST	\$2000.00
CHIRO REC SYST	\$2000.00

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P.O. BOX 3069
 REDDING, CA 96049

CIRCLE 287 ON READER SERVICE CARD

New On The Market

Bid-Rite System and Take-Off Probe

A contractor's estimating system that measures lengths, area, and volumes with a device that generates digital signals for computer processing. As the probe is moved along a drawing to take a measurement, the wheel turns and its movement is detected by a high-resolution optical sensor that generates a digital pulse for each bar passed under the sensor. The bars are located on a small drum that forms part of the wheel.

In the estimating process, the estimator calls up parts or groups of parts from a catalog of standards, applies the measurement and/or count. The results are written to a file for later recall on the screen or through a series of printed reports. Other features include variable labor rates and material mark-up categories, keyboard-entered difficulty factors, standard checklists, and Job Cost budget setup. (List Price: \$2,540, includes programs, RS 232 measuring probe, and manual) **Requires:** 64K RAM, CP/M, 200K for programs. **MANDAT SYSTEMS**
11155 120th Ave. N.E.
Kirkland, WA 98033
(604) 856-6441

**CIRCLE 571 ON READER
SERVICE CARD**

Inventory and Bill of Material

A menu-driven program for manufacturing companies that can inventory up to 90 different finished products and up to 999 different part numbers. Each product can have as many as 400 part numbers on its bill of material. The program offers three menus with fifteen selections and user-friendly instructions. Its available functions include, among others: automatically deducting all bill-of-material parts from inventory when a finished product is shipped; computing total inventory cost at any time or the material cost of any product; listing all parts with a unit cost over a given amount or with a total cost over a given amount; listing all parts shown to be at or below the reorder point; returning all parts to inventory if a finished product is returned. (List Price: \$695) **Requires:** 64K, two disk drives, printer.

Cyclo-Tronics, Inc.
1345 N. Old Rand Rd.
Wauconda, IL 60084
(312) 526-0800

**CIRCLE 615 ON READER
SERVICE CARD**

GolfCap

A software package that will enable golf leagues, golf courses and country clubs to calculate and save golf-handicap information for large numbers of golfers.

The program calculates USGA-type golf handicaps for 250 golfers per single-sided disk and stores up to 20 scores for each golfer. It will print lists by name or by handicap, wallet-sized cards for each golfer or small stickers for bag tags with name and handicap. It is designed to be used by inexperienced and novice computer users.

(List Price: \$49.95)

Requires: 64K, an 80-column display and a printer.

Systemics
3050 Spring
West Bloomfield, MI 48033
(313) 851-2504

**CIRCLE 576 ON READER
SERVICE CARD**

Depreciation Pak

A menu-driven depreciation program that permits selection of any of seven different depreciation methods. The alternatives include straight-line, sum-of-the-years digits, and accelerated cost recovery with current IRS percentages or four different percentages based on declining balance. User has the option of generating a report of annual totals on screen or a detailed printed report. (List Price: \$90) **Requires:** 48K, one disk drive, printer.

Software Integrated Systems
440 S. Federal Hwy.
#W-2

Deerfield Beach, FL 33441
(305) 427-2116

**CIRCLE 613 ON READER
SERVICE CARD**

UltraBOOT

A dynamic memory allocation utility program that provides users with the maximum possible versatility in choosing how much memory will be available for user programs.

The utility has somewhat the same effect as changing the computer's internal switches, but is operated from the keyboard. The program also sets the available number of disk drives up through four. When installed the program updates the top of memory pointer and "warm boots" the operating system from Drive A.

Also included with UltraBOOT on the UltraFAST software disk is UltraFAST, a flexible disk RAM emulator and UltraTRAP, a parity error handling utility. (List Price: \$39.95, or free when purchased with 512K memory board, \$895)

Requires: DOS.

Daystar Systems, Inc.
10511 Church Rd., #L
Dallas, TX
(214) 341-8136

**CIRCLE 565 ON READER
SERVICE CARD**

Sapana-LetterMerge

A menu-driven program to print form letters. The program merges the addresses from a mailing list created by the manufacturer's mailing list program Sapana-Mail-Track I with the letters prepared by WordStar, EasyWriter, EDLIN, or other editors or word processing programs that create DOS-compatible ASCII files.

Bid-Rite System and Take Off-Probe. MANDAT SYSTEMS



Features include the ability to merge selected labels belonging to specified groups and print the form letters; ability to print multiple copies of letters, and emergency return to main menu in most instances. (List Price: Free to owners of Mail-Track-I program if they send in their original program disk and \$5 to cover postage and handling)

Requires: 64K, one disk drive, 80-column display, parallel printer, DOS.

Sapana Micro Software
1305 South Rouse
Pittsburg, KS 66762
(316)231-5023

**CIRCLE 563 ON READER
SERVICE CARD**

EZ Entry

A simple invoicing and on-screen order-entry program designed to be used by novice PC users and small businesses. Program is self-documented and includes DOS, BASICA, and source code. It enables the user to store 200 product codes and prices and 500 orders per single-sided disk. Automatic extension and sales-tax computation is provided. Interface utility with accounting software is available. Hard-disk and double-sided disk versions are available. (List Price: \$99.95)

Requires: 64K, monochrome display, two disk drives, dot-matrix printer.
Systemics
3050 Spring St.
West Bloomfield, MI 48033
(313) 851-2504

**CIRCLE 614 ON READER
SERVICE CARD**

Typing Teacher

A program designed to teach users to type with speed and accuracy. It maintains individual figures on typing speed and accuracy, compares the current typing session with the previous session, and reports on the typist's progress.

The Typing Teacher contains menu selections for beginning typing, advanced typing, stored text matching, text file creation and maintenance, listing the text directory on the screen, printing the text files or directory on the printer, and creating a new text directory. (List Price: \$29.95)

Requires: 64K, one disk drive, 80-column monochrome display, 80 cps Matrix printer, BASICA.

SimSoft, Inc.
1258 17th St.
Marysville, MI 48040
(313) 364-7241

**CIRCLE 605 ON READER
SERVICE CARD**

Vector Sketch

An inexpensive CAD software package suitable for generating business graphics; space planning; and construction, architectural, mechanical, and electrical designs. It is to be used in conjunction with a Digi-Pad 5 digitizer. The package enables the operator to input drawings by entering data via a digitizer. Vectors are displayed on the graphics monitor and can be stored onto disk, plotted in sizes up to 24-inches by 36-inches or printed on a dot-matrix printer.

Drawings can be traced or made from simple components such as lines (5 styles), circles, arcs and boxes. A Zoom facility enables users to draw to the smallest level of detail. Objects may be aligned

Vector Sketch, GTCO Corporation



to grid boundaries or to the nearest vector. (List Price: From \$2,995, includes a 0.001-inch resolution digitizer)

Requires: Digitizer (supplied by GTCO), dual disk drives, graphics monitor and card, 256K RAM, asynchronous adapter.

GTCO Corporation
1055 First St.
Rockville, MD 20850
(301) 279-9550
Telex: 898471

**CIRCLE 583 ON READER
SERVICE CARD**

The RoseWare Directory

A menu-driven module which provides access to keyed subsets of similar products selected by the user from more than 2,000 PC-compatible products offered by over 900 vendors.

A typical product selection lists the product name, model number, current list price, hardware and software requirements, and a vendor-supplied description, including the vendor's address. Users can print out a complete product page and/or mailing labels. The data base is updated every six months (List Price: \$30)

Requires: 64K, one disk drive, an 80 column monitor, and printer.

The RoseWare Directory
1015 Gayley Ave., #323
Los Angeles, CA 90024
(213) 457-7110

**CIRCLE 654 ON READER
SERVICE CARD**

New On The Market

Night Mission Pinball

An arcade simulation program that recreates the look and sound of a real pinball table. The playfield has five bumpers, seven standup targets, nine rollovers, and is interlaced with sound routines to add to the realism of the play.

The game's theme is based on a World War II night bombing run. Completing the NIGHT lane-lite rollover sequence turns on the rollover lane arrows and activates a series of "bomb release line" city targets. Four standup targets control a bonus multiplier. A hole kicker can catch your ball, activating any one of a number of possible bonus features before ejecting the ball back into play. The game allows users to keep up to four balls in play simultaneously.

The game also offers 10 user-selectable modes of play to enable the player to modify the pace or the difficulty of play. Another feature allows users to create and save up to 100 custom modes of their own design. (List Price: \$39.95)

Requires: 64K, color/graphics monitor adapter.
subLOGIC Corporation
713 Edgebrook Dr.
Champaign, IL 61820
(217) 359-8482
Telex: 206995

CIRCLE 582 ON READER
SERVICE CARD



Night Mission Pinball, subLOGIC Corporation

GRAPHWRITER

A professional quality business graphics software package which is the software component of a separate business graphics system.

With the program and a pen plotter, users can produce presentation graphics on paper or transparency from a catalog of over 40 business graphics formats including pie charts, bar charts, line charts, organization charts, Gantt charts, bubble charts and others.

The program will be sold in two sets, the Basic Set and the Extension Set. A two-pen plotter is also available. (List Price: \$395 for one set, \$750 for both sets, \$1,500 for two-pen plotter)

Requires: 128K, two disk drives, RS-232 asynchronous part, plotter.
Graphic Communications, Inc.
200 Fifth Ave.
Waltham, MA 02254
(617) 890-8778

CIRCLE 621 ON READER
SERVICE CARD

WS-PATCH, WS-KEYS

Two programs for use with WordStar. WS-PATCH enables PCs equipped with dot matrix printers to print five different character sizes in a variety of type styles. Superscripts, subscripts and underlining are also possible. WS-PATCH amends the print control menu in WordStar so that new printing capabilities and their associated control code sequences are displayed when CNTL P is pressed.

WS-KEYS allows WordStar users to re-define the 10 IBM function keys to any command sequence or word up to six characters long. WS-KEYS can be re-run as often as needed. (List Price: \$39.95, \$24.95 WS-KEYS only)
Requires: Available from manufacturer.
CMB3 Enterprises
1412 Gatewood Court
Martinez, CA 94553
(415)372-7733

CIRCLE 561 ON READER
SERVICE CARD

HEY DIDDLE DIDDLE

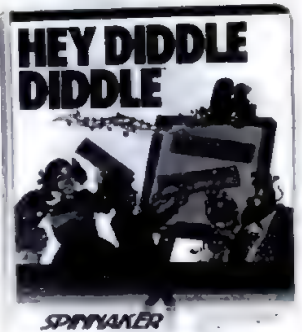
A collection of 30 classic nursery rhymes featuring color graphics and music. This learning game helps children understand how words and rhythms create poetry and even lets them take fragmented thoughts and rearrange them to form coherent verse.

The program consists of material appropriate for three levels. STORYTIME, for pre-readers, is a continuous display of 30 rhymes with pictures and music for the child to watch and enjoy. STORYBOOK (for beginning readers) lets the child see each rhyme formed in slow motion with words and pictures. RHYME-GAME (for more advanced readers) presents two levels of play. The child can choose to unscramble either the first four lines or the entire eight-line nursery rhyme. Racing against the clock or another player, the child attempts to rearrange the lines in the correct order. (List Price: \$29.95)
Requires: Available from manufacturer.

Spinnaker Software
215 First St.
Cambridge, MA 02142
(617) 868-4700

CIRCLE 585 ON READER
SERVICE CARD

HEY DIDDLE DIDDLE,
Spinnaker Software Corp.



**Apple
II**

Quality Disk Software from **SPECTRUM**

**IBM
PC**

PERSONAL FINANCE MASTER

The premier personal and small business financial system. Covering all types of accounts including check registers, savings, money market, loan, credit card and other asset or liability accounts, the system has these features:

- Monthly Transaction Reports
- Budgets Income & Expense
- Reconciles to Bank Statements
- Prints Checks & Mailing Labels
- Automatic Year-End Rollover
- Prepares a Net Worth Report
- Searches for Transactions
- Handles Split Transactions
- User-Friendly Data Entry Forms
- Fast Machine Language Routines
- Extensive Error Trapping
- HI-RES Expense/Income Plots

For Apple II (48K) & IBM PC \$75.00
Manual & Demo Disk only \$15.00

COLOR CALENDAR

Got a busy calendar? Organize it with Color Calendar. Whether it's birthdays, appointments, business meetings or a regular office schedule, this program is the perfect way to schedule your activities. The calendar display is a beautiful HI-RES color graphics calendar of the selected month with each scheduled day highlighted in color. Using the daily schedule, you can review any day of the month and schedule an event or activity in any one of 20 time slots.

For Apple II (48K) \$30.00

BUSINESS SOFTWARE SERIES

Both Programs \$250.00

A user-friendly yet comprehensive double-entry accounting system employing screen-oriented data input forms, extensive error-trapping, data validation and special routines for high speed operation. The series includes these two modules:

GENERAL LEDGER: A complete accounting system with these features:

- Up to 500 accounts and 500 transactions per month.
- Interactive on-screen transaction journal
- Prints checks and mailing labels.
- Produces these reports:

Transactions Journal	Balance Sheet
Account Ledgers	Account Listings
Income Statement	

For Apple II (48K) & IBM PC \$150.00

ACCOUNTS RECEIVABLE

A flexible system with these features

- Up to 500 accounts and up to 500 invoices per diskette.
- Prints invoices, customer statements & address labels.
- Interfaces to General Ledger.
- Interactive screen-based invoice work sheet.
- Produces these reports:

Aged Receivables
Sales Analysis
Account Listings
Customer Balances

For Apple II (48K) & IBM PC (2 DRIVES) \$150.00

LOGIC DESIGNER & SIMULATOR

An interactive HI-RES graphics program for designing and simulating digital logic systems. Drawing directly on the screen the user interconnects gates, including **NAND, NOR, INVERTER, EX-OR, T-FLOP, JK-FLOP, D-FLOP, RS-FLOP, USER-DEFINED MACRO** and **N-BIT SHIFT REGISTER** types. Network descriptions for the simulation routines are generated automatically.

The program is capable of simulating the bit-time response of any logic network responding to user-defined source patterns. It will simulate networks of up to 1000 gates. Includes a source pattern editor, **MACRO** editor and network editor. Produces a fan-out report. Simulation output is a string of 1's & 0's representing the state of user selected gates for each bit time of the simulation.

A typical page of a logic drawing looks like this:



For Apple II (48K) & IBM PC (2 DRIVES) \$250.00
MANUAL AND DEMO DISK: Instruction Manual and demo disk \$30.00

MATHEMATICS SERIES

The Series Includes These 4 Programs:

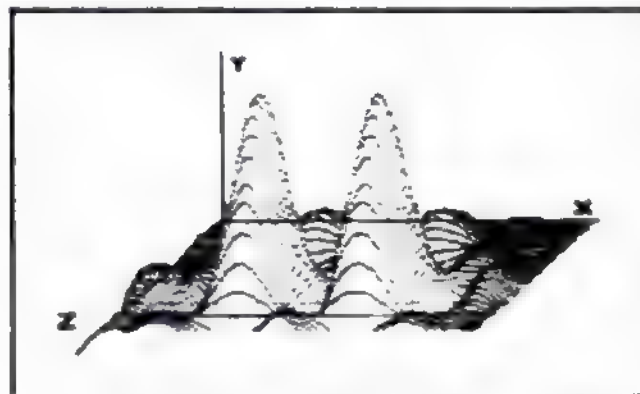
STATISTICAL ANALYSIS: This menu driven program performs **LINEAR REGRESSION** analysis, determines the mean, standard deviation and plots the frequency distribution of user-supplied data sets.

NUMERICAL ANALYSIS: HI-RES 2-Dimensional plot of any function. Automatic scaling. At your option, the program will plot the function, plot the **INTEGRAL**, plot the **DERIVATIVE**, determine the **ROOTS, MAXIMA, MINIMA** and **INTEGRAL VALUE**.

MATRIX: A general purpose, menu driven program for determining the **INVERSE** and **DETERMINANT** of any matrix, as well as the **SOLUTION** to any set of **SIMULTANEOUS LINEAR EQUATIONS**.

3-D SURFACE PLOTTER: Explore the **ELEGANCE** and **BEAUTY** of **MATHEMATICS** by creating **HI-RES PLOTS** of 3-dimensional surfaces from any 3-variable equation. Disk save and recall routines for plots. Menu driven to vary surface parameters. Hidden line or transparent plotting.

For Apple II & IBM PC \$50.00

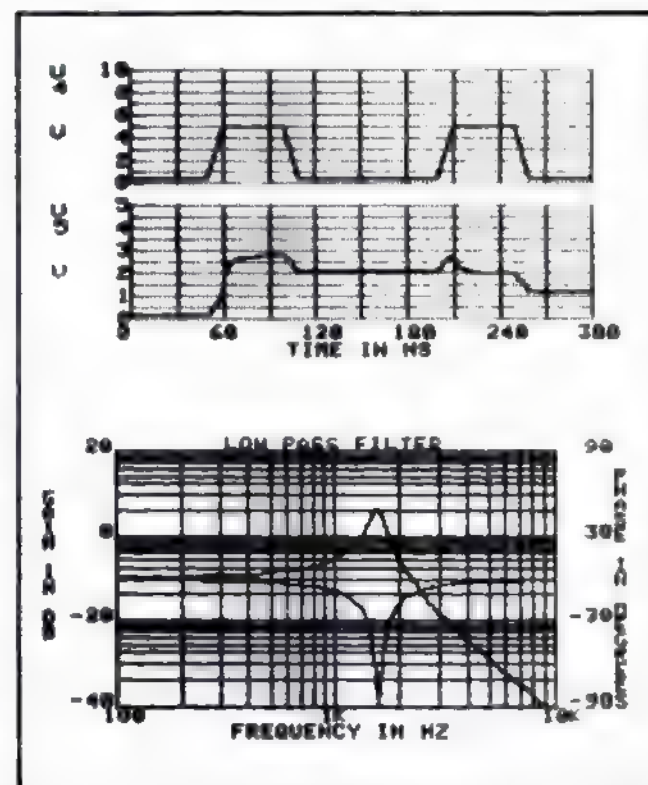


μCAP

Microcomputer Circuit Analysis Program

Tired of trial & error circuit design? Analyze and debug your designs before you build them. With **μCAP** you simply sketch your circuit diagram on the CRT screen and run an **AC, DC** or **TRANSIENT ANALYSIS**. Your circuit may consist of **RESISTORS, CAPACITORS, INDUCTORS, DIODES, BATTERIES, BIPOLAR** or **MOS TRANSISTORS, OPAMPS, TRANSFORMERS**, and **SINUSOIDAL** or **USER-DEFINED TIME DEPENDENT VOLTAGE SOURCES**. **μCAP** can analyze any such network containing up to 40 separate nodes. Includes a user controlled **MACRO** library for modelling complex components such as **OPAMPS** and **Transistors**.

Typical **μCAP** AC and Transient Analysis graphs:



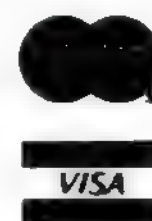
For Apple II (48K) & IBM PC (2 DRIVES) \$475.00
Manual & Demo Disk \$30.00

ORDERING INSTRUCTIONS: All programs are supplied on disk and run on Apple II (48K) with a Single Disk Drive or IBM PC (64K) with Single Disk Drive unless otherwise noted. Detailed instructions included. Orders shipped within 5 days. Card users include card number. Add \$2.00 postage and handling with each order. California residents add 6 1/2% sales tax. Foreign orders add \$5.00 postage and handling per product.



**SPECTRUM
SOFTWARE**

690 W. Fremont Ave.
Sunnyvale, CA 94087



FOR PHONE ORDERS:

(408) 738-4387

DEALER INQUIRIES INVITED.

New On The Market

MATH BLASTER

An educational software product that turns the computer into an effective instructional tool as well as a math arcade game.

The program contains over 600 problems in addition, subtraction, multiplication, division, fractions and decimals for students aged 6 through 12. The problems are grouped in "families of facts" and can be used with four different learning activities, including a fast-action arcade game.

The program also contains an editor that allows the user to enter new problems in any of the four learning activities. (List Price: \$49.95 includes 2 disks and manual)

Requires: Available from manufacturer.

Davidson & Associates
6069 Groveoak Place, #12
Rancho Palos Verdes, CA 90274
(213) 378-7826

CIRCLE 568 ON READER SERVICE CARD

COST-ACUMEN

A cost accounting and project management program for architectural and engineering firms, research and development groups, and other professional consultants. The program requires no previous computer background and adapts to existing ways of doing business. Extensive cross-checks ensure accuracy of processed information. (List Price: \$995, demonstration copy \$95, cost is deductible from total)

Requires: CP/M 86.

Computer Applications Corporation
Program Products Division
2400 Poplar Ave., #318
Memphis, TN 38112
(901) 458-8630

CIRCLE 562 ON READER SERVICE CARD

SIM3278

A software package that links microcomputers and asynchronous terminals to IBM mainframe computers. This protocol conversion software provides for the full-screen functions of an IBM 3278 while using an inexpensive ASCII video display terminal without any hardware or operating system modifications or additions. Up to 255 terminals per simulator and over 30 different terminal types can be supported.

The program operates essentially by translating 3270 data streams into ASCII control sequences, valid for the specific type of CRT and vice versa. The software is completely table-driven, supports any mix of terminal types, and allows terminals to be physically located anywhere.

The package includes several unique features, such as a multiple-session manager, on-line Help, and host-to-micro data transparency. (List Price: \$5,500 per single CPU license, with operation/installation manual and 30-day free demonstration tape)

Requires: Available from manufacturer.

AZTEK Computing Inc.
969 Bronson Ave., #212
Ottawa, Ontario, Canada K1S 4G8
(613) 235-6736

CIRCLE 579 ON READER SERVICE CARD

NBI Word Processing

A professional-level word processing program available for the PC and the PC-XT. Available functions include form letters; printing while editing; automatic centering; indent; word wraparound; outline formatting; disk password security; an alphabetized, printable directory; typewriter mode, which allows line-by-line printing for forms and envelopes; block copy; move and delete; decimal tabs; delete character, word, line and

block; display of page breaks and document insertion. User-assist menus are available at three increasing levels of detail.

There is a training guide, reference guide, reference card and an adhesive-backed keyboard layout.

The program includes an NBI co-processor board. It inserts into the PC and provides 64K bytes of memory and space to allow memory expansion in 64K increments up to a maximum of 192K bytes.

The program supports a variety of character and dot matrix printers. (List Price: \$695)

Requires: One disk drive, 80 by 25 monitor, 64K RAM, printer.

NBI

P.O. Box 9001
Boulder, CO 80301
(800) NBI-1111

CIRCLE 567 ON READER SERVICE CARD

NBI Word Processing, NBI



Fast Graphs, Innovative Software



Fast Graphs

A color graphics program that can draw color charts, graphs, or pictures representing business or scientific data.

The program produces high-resolution color pictures on the display screen or on plain paper. The program also allows users to create a chart on the color display then save it to disk or print it on a printer or plotter. The system is pre-programmed to draw bar, pie, or line charts with shadows, circles, boxes, arcs, line or points. Fast Graphs can take data from the keyboard, but it can also create color charts from data contained in the manufacturer's T.I.M. database manager program or VisiCalc DIF files.

Charts can be labeled in two character sizes while mixing more than one graphing technique to a given chart. Bar graphs can be oriented horizontally or vertically, comparatively or stacked, in two or three dimensions, using up to six data sets, and displayed in activity vs. time format, if the user so chooses.

Plotting points can be designated by triangles, circles, or squares to make interpretation easier.

Another program feature allows users to reproduce a company logo, save it on disk for future use, and place it anywhere on the chart. (List Price: \$295)

Requires: 128K, two disk drives, color board, display, and color graphics printer/plotter.

Innovative Software
9300 West 100th St., #380
Overland Park, KS 66210
(913) 383-1089

CIRCLE 629 ON READER
SERVICE CARD

The Statistician

A program of approximately 100 Fortran Subroutines on six disks. These subroutines are designed to aid the mathematician and scientist in performing mathematical functions. Both the compiled objects and sources are provided on the disks.

The subroutines cover data screening, correlation and regression, design, discriminant, factor, and time series analysis, nonparametric statistics, generation and distribution functions, matrix and storage operations, Eigen analysis, matrix and polynomial solutions, and linear analysis.

(List Price: \$295)

Requires: 128K, one single-sided disk drive, Fortran compiler. (256K, two disk drives recommended).

Alpha Computer Service
P.O. Box 2517
Cypress, CA 90630
(714) 894-6808

CIRCLE 581 ON READER
SERVICE CARD

Small Fortune Auto-Ledger

A menu-driven general ledger designed to be used by people without prior accounting or computing experience. The program can accommodate several hundred income, expense, asset, liability and capital accounts and allows users to compare expenses to budget on a monthly, quarterly, or year-to-date basis and know the exact balances of all charge accounts, loans and notes at any time.

Using double entry for cash accounts, the system employs error-avoidance routines to insure the accounts stay in balance. Single entry is also provided for non-cash transactions. The user has the option of using account numbers, names, or a combination of both.

The Reports Modules is a special program feature that includes a balance sheet and income statement that can be modified to the user's particular needs. (List Price: \$50)
Requires: 64K, one disk drive, 80-column display. Printer is optional.

Emerald Software, Inc.
2416 Warren Ave., North
Seattle, WA 98109
(206) 282-2100

CIRCLE 639 ON READER
SERVICE CARD

New On The Market

ReadiWriter

A document formatting system for form letters, books, or manuals. The program supports a variety of printers and printer features.

The program must be used with a word processing program that creates and edits the input documents. The Read-Writer includes four major features; formatting capabilities include proportional spacing with micro justification, parametric printer definitions which allow support of almost any printer, compatibility with the IBM main-frame document composition facility GML and script languages, and a self-extension feature which allows building of new commands.

The program automatically generates tables of contents, accumulates numbers, places footnotes at the bottom of pages, numbers lists, adds page headings and footings, and builds indexes. Users can underscore, boldface, italicize, center or right align text. The program also builds tables with tabs even in proportional mode, and conditionally ends pages depending on room remaining. (List Price: \$95)
Requires: 128K, two disk drives, MS-DOS.

ReadiWare Systems
P.O. Box 680
West Redding, CT 06896
(203) 431-3521

**CIRCLE 645 ON READER
SERVICE CARD**

ColorBIZ Inventory

An inventory management program with an interactive database and report generator. The program allows users to handle such information as multiple stores, dual item or part numbers, location codes, and sizes. Online directions and full color user guide are included. Program can be run in black/white. Multi-color bar charts can be produced for analyzing various inventory situations. Password security is also included. Users can also create worksheets for set-up, analysis, and valuation. Usage and margin analysis by month and y-t-d can be created. Password security is also included. (List Price: \$498)

Requires: 64K, one disk drive.
ColorCorp
208 North Berkshire
Bloomfield Hills, MI 48013
(800) 521-0793
(313) 335-2255

**CIRCLE 644 ON READER
SERVICE CARD**

ColorBIZ Gambler

A casino games package that includes Blackjack, Baccarat, and Keno. Users can select the type of casino, table minimums, dealer, colors, number of players and number of decks. Program can be run in black/white and keeps track of winnings, losses, and commissions. (List Price: \$28)

Requires: 64K, one disk drive.
ColorCorp
208 North Berkshire
Bloomfield Hills, MI 48013
(800) 521-0793
(313) 335-2255

**CIRCLE 641 ON READER
SERVICE CARD**

QUICK-TEXT

A fully integrated, full screen word processor and text editor for the novice or business user. It was designed with extensive use of sound, function keys, ghost cursor, and screen highlights. The system provides the features required to create, edit and print documents or files. The program can work with either QUICK-TEXT documents or standard DOS files.

A spelling aid is included that allows users to check spelling as words are entered. Checking is accomplished by placing the cursor anywhere on the word and pressing a function key. The spelling dictionary contains over 1,500 of the most frequently misspelled words and can be increased by the user.

Other features include automatic word wrap, right justification, character insert and delete, line centering, text reformat, left and right margin control, block move/copy/delete, and line tabs. (List Price: \$55)

Requires: 64K, two disk drives, 80-column display, printer.
Distributed Software Systems
P.O. Box 1301
Northbrook, IL 60062
(312) 634-1511

**CIRCLE 631 ON READER
SERVICE CARD**

ColorBIZ Loan

A program that analyzes numerous financing alternatives and allows for quick analysis of various loan situations. The program can calculate any loan value, store loans, and print or display monthly or yearly amortization schedules. Users can check loan status for any period desired, determine balloon payoffs, or cash requirements. Program can be run in color or black/white.

(List Price: \$28)
Requires: 64K, single disk drive.

ColorCorp
208 North Berkshire
Bloomfield Hills, MI 48013
(800) 521-0793
(313) 335-2255

**CIRCLE 642 ON READER
SERVICE CARD**

ColorBIZ BioRhythm

A program to aid the user in determining emotional, physical and intellectual cycles. Features include congeniality comparisons, display and graphic printout, and storage and retrieval of names/birth-dates through BioRhythm reference guide. The program can be run in color or black/white. (List Price: \$27)

Requires: 64K, one disk drive.
ColorCorp
208 North Berkshire
Bloomfield Hills, MI 48013
(800) 521-0793
(313) 335-2255

**CIRCLE 640 ON READER
SERVICE CARD**

The Running Log

A program that acts as a log for runners storing and analyzing running data. The program stores up to 13 items per run for up to two runs per day. Several tables and graphs are provided to display data for viewing and analysis.

Log items include miles, time, temperature, course, speed, subjective rating, shoes, pulse, humidity, weight, notes, plus two items of the user's choice. The user may use as many or as few of the log items as desired. The log is adaptable to all levels of runners. (List Price: \$44.95)

Requires: 64K, two disk drives, graphics adapter, 80-column screen.

Marathon Software
Box 26 Pinecrest
Clancy, MT 59634

CIRCLE 646 ON READER
SERVICE CARD

Wordtrix

A word game that pits the player against the PC. Both the player and the computer find words in a random grid of letters. The PC includes a built-in dictionary and multiple levels of play. Best scores are saved on disk. (List Price: \$34.95)

Requires: 64K, one disk drive, PC-DOS 1.0 or 1.1.

Insoft, Inc.
10175 SW Barbur Blvd.
#202B
Portland, OR 97219
(503) 244-4181

CIRCLE 650 ON READER
SERVICE CARD

The EXTERMINATOR

A maze game for one or two players. Players must navigate the maze and exterminate bugs before they destroy the player. Players must find the hidden cans of insecticide to win. Game features automatically increasing levels of difficulty, joystick or keyboard control. (List Price: \$29.95)

Requires: 64K, one disk drive, color/graphics adapter, PC-DOS.

Distributed Software Systems
P.O. Box 1301
Northbrook, IL 60062
(312) 634-1511

CIRCLE 649 ON READER
SERVICE CARD

FLIPPERBALL

A pinball-emulation game for one to four players that includes sound and graphics effects. Program allows users to compete for a "championship title," records high scores and uses left and right keyboard "flipper" control. (List Price: \$29.95)

Requires: 64K, one disk drive, color/graphics adapter, PC-DOS.

Distributed Software Systems
P.O. Box 1301
Northbrook, IL 60062
(312) 634-1511

CIRCLE 648 ON READER
SERVICE CARD

TE100 Version 1.1 and TE100-FT

Two terminal package emulation, designed to emulate the DEC VT100, VT101, VT102, and VT52 terminals. TE100 includes 75 to 9600 baud; full character attributes; keyboard emulation, including all special function keys used by DEC editors; line and character insert and delete; modification of terminal characteristics from the host computer; and full local printer support. TE100 also allows the user to define four separate setup configurations to simplify communication with different host computer systems. In addition, each setup configuration can include ten "softkey" definitions containing ASCII sequences such as auto-dial and log-in commands.

TE100-FT is an extension of TE100 that adds bi-directional file transfer capabilities. It allows the user to capture data being sent to the terminal into a disk file, and to transfer ASCII programs or data files to the host computer. TE100-FT is also able to transmit and receive ASCII files using an "error-free" protocol designed to eliminate the problems of data loss when transferring data over noisy telephone lines. (List Price: TE100 Version 1.1, \$125; TE100-FT, \$150)

Requires: TE100 Version 1.1: 64K, one disk drive, monochrome or 80-column color monitor, PC-DOS. TE100-FT: 64K, two disk drives, monochrome or 80-column color monitor.

Persoft, Inc.
2186 U.S. Highway 51
Stoughton, WI 53589
(608) 873-8888

CIRCLE 684 ON READER
SERVICE CARD

EDUBAS I and II

An educational software package designed for those who want to learn how to program with BASIC. EDUBAS I shows the first time user how to handle immediate mode, deferred mode, input/output functions, branching and loops, flow charting, graphics, subroutines, and debugging.

EDUBAS II deals with the advanced functions of BASIC such as string and sub-string manipulations, file manipulations (sequential and random), advanced graphics and colors, and advanced BASIC instructions.

Each program includes three disks containing computerized lessons, exercises, and instructions. (List Price: EDUBAS I, \$95; EDUBAS II, \$105. Complete package, \$170)

Requires: 64K, one disk drive, DOS, BASICA, color graphic monitor adaptor, 80-column black-and-white or color

EUROPRO, Inc.
129 Saratoga
Petaluma, CA 94952
(707) 763-9700

CIRCLE 673 ON READER
SERVICE CARD

New On The Market

PC-ORDER ENTRY INVENTORY

A perpetual inventory system that can be incorporated into the manufacturer's PC-ORDER ENTRY SYSTEM. The inventory system provides a means of recording increases and decreases in the amounts of inventory. The system will maintain the quantities of stock-on-hand items and notify the operator when stock has reached a zero or back order point.

Features allow users to maintain quantity of stock-on-hand; maintain reorder points of stock items; reduce in-stock amounts when order is entered; produce a report of all items below the reorder point; highlight out-of-stock items when the order is taken and update when new stock arrives. (List Price: \$50)

Requires: 64K, two disk drives, PC-ORDER ENTRY SYSTEM program, 80-column display, printer.

Distributed Software Systems
P.O. Box 1301
Northbrook, IL 60062
(312) 634-1511

CIRCLE 632 ON READER SERVICE CARD



Freeform, Dimension Software Systems, Inc.

NOVACALC

A spreadsheet/financial planner that can be used to perform math, trig, log, sum, and average functions for depreciation (DEP), net present value (NPV), rates of return (IRR), and true consolidation or roll-up (RUP) for 3-D spreadsheet operations. The program also features decimal and comma format control, selective column printing, wide carriage printing, help menu and help screen, underlining, protected data fields, and sharing of data among worksheets to avoid data re-entry. (List Price: \$24.95)

Requires: 128K, two disk drives. Printer is optional.

Hourglass Systems
P.O. Box 312
Glen Ellyn, IL 60137
(312) 690-1855

CIRCLE 653 ON READER SERVICE CARD

Freeform

A program designed to bring mainframe capabilities to smaller computers, providing over 60 users with up to 10 billion bytes of database. Freeform allows the office manager or novice to perform complex operations without programmer assistance. The user can create custom applications for accounts payable, database applications, general ledger, and a wide range of other business requirements. Other features include screen formatting, report generation, application program generation, and graphics. (List Price: \$2,000 site license, \$700 per program copy, discounts available)

Requires: 192K, one floppy disk, one serial port.
Dimension Software Systems, Inc.
605 E. Safari
Mail Stop C4
Grand Prairie, TX 75050
(214) 262-8201

CIRCLE 657 ON READER SERVICE CARD

Multi-Currency General Ledger

A menu-driven program that provides financial information by individual currency and consolidates balance sheet and income statement data in different currencies into a single report. It will perform an automatic revaluation of foreign currencies to current rates, and calculate the profit and loss due to these rate movements. This program can also store transaction data, and may therefore be used to produce customer and due-to/due-from account statements.

The Multi Currency General Ledger package also includes a seven lesson tutorial program. This tutorial leads the user through a step-by-step instruction course, introducing and explaining each of the system's functions. (List Price: \$3,800)

Requires: 64K, two disk drives, MS-DOS, printer.
Nissim Associates
2714 Pine St.
San Francisco, CA 94115
(415) 563-6170

CIRCLE 658 ON READER SERVICE CARD

YOU DESERVE THE BEST

FIXED ASSET SYSTEM

PC/FAS is an easy-to-use record-keeping system that makes it simple for you to have complete and accurate records of your property and equipment for the IRS, state and local governments, insurance companies, and your business auditors.

PC/FAS automatically calculates ACRS and five other types of depreciation and investment tax credits needed for you to get the full value from new, lucrative depreciation tax laws.

Its wide selection of reports gives you complete management information on up to 99,999 owned or leased items of property or equipment in your office, plant, home or fleet. **PC/FAS** reports on each item by location, custodian, date, vendor, manufacturer, etc.

PC/FAS provides information that is essential for good management, required by the IRS, and invaluable in case of fire or theft.

PC/FAS is designed to fit in with your current system. It adjusts to any fiscal year, tracks unusual depreciation methods, and can keep two depreciation schedules for each asset.

Despite its power, **PC/FAS** is easy to use. It takes full advantage of the IBM-PC, uses all function keys, backward/forward tabbing, minimum key strokes for easy data entry. It gives you the quality and power that mainframe users expect. Its on-the-screen prompts assist you whenever you need help and its complete, easy-to-read manual meets our highest standards of quality.

Both **PC/FAS** and **PC/PFP** require DOS 1.0 and 1.1 with 64K RAM or DOS 2.0 with 128K RAM.

The Quality Software Company

**BEST
PROGRAMS**

P.O. Box 2370, Alexandria, VA 22301 (703) 549-3663

PERSONAL FINANCE PROGRAM

PC/PFP is the **Best** cash management system for your business or home for only \$95.00. This best-selling program is exciting because it shows you through a large choice of pre-formatted reports, bar graphs, and on-the-screen displays where your money comes from and where it goes.

Businesses have found the precise, easily accessible, and complete summaries and reports of all receipts and income are invaluable management tools that can easily (and **less expensively**) be transformed by CPA's into tax reports, income statements, and balance sheets.

WE LOVE TO READ OUR MAIL... YOU WOULD TOO!

"Brilliant software! Why? Because it is simple. Covers all needed uses. You deserve much credit as everything is so well planned out. Price is most attractive."

Mr. Erwin Jackson, Jr. Charlotte, North Carolina

I consider PFP to be one of the finest programs for the IBM PC."

Barry N. Parsley, M.D. Lexington, Kentucky

"I have bought programs since 1977 and I can unequivocally say that PC/PFP is the best buy for the money I have ever made. Please keep developing programs. The industry needs your high standards, and your reasonable prices."

Mr. James Gore Creskill, NJ

"The program works well and is easy to use. The newsletter is good and I must say the level of customer support couldn't be better."

Lorne Sheren, M.D. Staten Island, NY

"Your User Report is hot...support from software publishers is a welcome help."

Michael Truffer Deltona, Florida

HERE'S WHAT OUR REVIEWERS SAY:

"Best Product's PC/PFP is first class all the way. Any company looking to sell to the personal computer market should take Best's whole package as a model — this is the way it should be done. Best Programs offers a superior package in all respects. Best is best of this lot."

Carey Saudler PC Magazine, Vol. 1, No. 10

"Well-documented...program runs smoothly, and always presents clear, easy-to-understand prompts. Functionally, PC/PFP is complete. The program is well done and a good value."

Will Fastie Creative Computing, January 1983

"My overall impression of PC/PFP is a good one...suits the needs of a great number of people who want simple, straightforward help in their personal finances."

Cliff Smith, C.P.A. Capital PC Users Group Monitor

New On The Market

Property Management

A real estate management program that works with the PC with or without a hard disk.

The program performs all bookkeeping functions needed for residential or commercial property with as many as 1,000 renters or lease-holders, depending on hardware configuration. Financial records, including income and expense summaries, and individual tenant records can be generated.

By entering initial tenant records, the user can set up the PC to automatically post rental charges to each tenant's balance. The program will automatically record a complete history of all tenant charges, deposits, refunds, payments, and write-offs, maintaining current balances for all tenant accounts. (List Price: \$695)

Requires: 128K, two disk drives, PC-DOS.

Continental Software
11223 S. Hindry Ave.
Los Angeles, CA 90045
(213) 410-3977

**CIRCLE 622 ON READER
SERVICE CARD**

T/Maker III

A software program that offers many of the features of both electronic spreadsheets and word processors. It can be used to generate mailing lists, sort records, create bar charts, build tables, edit text, and perform accounting functions. A reference manual is included. (List Price: \$275)

Requires: 128K, two disk drives, PC-DOS.

T/Maker
2813 Flagmaker Dr.
Falls Church, VA 22042
(703) 532-3509

**CIRCLE 663 ON READER
SERVICE CARD**

INFOTORY

A menu-driven inventory-management system, now available for the hard-disk drive. The hard-disk version of INFOTORY will accommodate 25,000 inventory items. Retrieval time for any one item is about one second. The system retains its special features, including the Item Category Summary Report (which provides MTD and YTD sales and cost-of-sales information summarized by departments, product lines, or any other user-defined category) and ANYREPORT which allows inventory reports, price lists, and sales/cost analysis reports to be either scrolled on the video monitor or printed out, with report designs saved if desired to be recalled for future use. (List Price: \$575)

Requires: 5M-byte disk drive with 96K, printer.
SSR Corp
1600 Lyell Ave.
Rochester, NY 14606
(716) 254-3200

**CIRCLE 655 ON READER
SERVICE CARD**

TELEMATH

A set of math reinforcement software programs featuring arcade-style graphics to maintain student interest and stimulate student achievement. TELEMATH consists of 80 programs designed to reinforce 148 basic math objectives.

The 80 programs are available in a two-volume set, 40 programs in each volume. The programs contained in Volume 1 are also available on ten separate disks, four programs to a disk. Because of their competitive nature, the 40 programs in Volume 2 require special TELEMATH paddles for student input. (List Price: \$40 for one disk; \$350 for one volume. TELEMATH paddles list for \$200)
Requires: 64K, one disk drive, color graphics board.
Psychotechnics, Inc.
1900 Pickwick Ave.
Glenview, IL 60025
(312) 729-5850

**CIRCLE 664 ON READER
SERVICE CARD**

DATA DESIGN

A menu-driven relational database management system that features help screens, 26 simultaneous indexes (sorted orders), multiple input/output forms, calculated fields with post option, internal backup, and a phone communication system. (List Price: \$225)

Requires: 128K, two disk drives, PC-DOS. A printer is recommended.

Insoft, Inc.
10175 S.W. Barbur Blvd.
3202B
Portland, OR 97219
(503) 244-4181

**CIRCLE 662 ON READER
SERVICE CARD**

TELEMATH, Psychotechnics, Inc.

Introducing

telemath

80 Validated Math Programs

For use on:
• Apple II
• IBM

Valid for:
• 1 Person
• 2 Persons
• Teams

Validated as effective by the California Department of Education
A research supported mathematics curriculum for Grades 1-8

Accountant Series II

An expanded version of the Accountant series of integrated accounting software (G/L, A/R, A/P, Payroll). New features such as automatic service charges, mailing labels for customers and vendors, and compilable code for increased speed have been added. In addition, the manuals include startup and operational sections. (List Price: \$365) Requires: 64K, two disk drives, PC-DOS, 132-column parallel printer.

Insoft, Inc.

10175 S.W. Barbur Blvd.

#202B

Portland, OR 97219

(503) 244-4181

CIRCLE 461 ON READER
SERVICE CARD

Payment Scheduler

An amortization schedule printing program designed to create special payment schedules for mortgages and other loans. The program will prepare a month-by-month schedule based on the desired payment, the principal balance, and the interest rate.

(List Price: \$39.95)

Requires: 64K, one disk drive, 80-column monochrome display, 80 cps Matrix printer, BASICA.

SimSoft, Inc.

1258 17th St.

Marysville, MI 48040

(313) 364-7241

CIRCLE 674 ON READER
SERVICE CARD

V.I.P. Mailer

A mailing label system designed for the business user to keep track of important customers' names and addresses. This system allows additional customer information to be stored and printed.

Upon request, the program will print labels in standard size print font. Labels can be printed for only one customer or for as many as are stored on the master file. One time single labels can be defined and printed at any time and in any number. (List Price: \$34.95)

Requires: 64K, one disk drive, 80-column monochrome display, 80 cps printer, BASICA. Simsoft, Inc. 1258 17th St. Marysville, MI 48040 (313) 364-7241

CIRCLE 472 ON READER
SERVICE CARD

GRADEBOOK 2.5

A disk program that allows teachers to store, retrieve, print, correct, and calculate grades and scores. The program stores up to 200 scores per disk (in any combination of class size). Grades can be weighed according to any formula that the user chooses.

(List Price: \$36.95)

Requires: 64K, one disk drive; printer optional.

MMCC Educational Software
4732 Fairview Ave.
Downers Grove, IL 60515
(312) 852-8640

CIRCLE 682 ON READER
SERVICE CARD

DMS (Diskette Management System)

A menu-driven system designed to help the user keep track of disks. Each disk is assigned a volume serial number, beginning with 0001.

This number is printed on the disk label and on the disk sleeve, and becomes the key to the master file of disks. Additional information, including disk description, disk location, creation date, and date when the disk may be used again, is also stored in a file.

The system also contains routines for adding new disks to the master file, updating information through a change routine, viewing disk information on the CRT screen, deleting a disk from the master file, printing a disk management report, and printing a disk-ready-for-reuse-report.

(List Price: \$34.95)

Requires: 64K, one disk drive, 80-column monochrome display, 80 cps Matrix printer, BASICA.

Simsoft, Inc.

1258 17th St.

Marysville, MI 48040

(313) 364-7241

CIRCLE 671 ON READER
SERVICE CARD

Diet Analyzer

A program designed to help diet-conscious users monitor their daily food consumption for vitamin, mineral, calorie, fat, sodium, carbohydrate, and protein content.

Amounts of food consumed during the day are entered through program prompts. The foods are then analyzed against the information in the database and a printed report is prepared showing the nutritional value of the diet. (List Price: \$29.95)

Requires: 64K, one disk drive, 80-column monochrome display, 80 cps Matrix printer, BASICA.

SimSoft, Inc.

1258 17th St.

Marysville, MI 48040

(313) 364-7241

CIRCLE 673 ON READER
SERVICE CARD

New On The Market

Direct.Connect

A terminal and transfer program for communicating with other computers. This program captures data to a disk file or a printer and sends files to other computers.

Direct.Connect features over 25 different help screens, ALT keys, instant notification of communication errors, programmable function keys, and screen paging. It also allows the user to change communication and display parameters, and provides the option of using either the first or second serial interface. (List Price: \$145)

Requires: One disk drive, 96K RAM, 80-column monitor, RS-232C serial interface.

Direct Aid
393-C South Broadway
Boulder, CO 80303
(303) 494-8265

CIRCLE 683 ON READER
SERVICE CARD

BLOWUP

A printing program that allows users to print signs and/or notices in block characters one-inch high.

The package handles a set of 90 characters. Each program character prints in a 10-character by 10-line image on the printer. Users can copy and distribute the program without penalty. A copy of the program is available at no cost for users to try out. If pleased with the program, users should send \$20 to the publisher. (List Price: \$20)

Requires: 32K, BASIC.
Robert A. Murray and
Associates
9110 31st Ave., N.W.
Seattle, WA 98117
(206) 783-9494

CIRCLE 620 ON READER
SERVICE CARD

Programmer's Tool Kit

A set of structured BASIC business software development modules consisting of a Screen/Keyboard Manager and over 40 additional programming routines.

The Screen/Keyboard Manager is a generalized BASIC routine that can be merged into existing programs or used to write new programs. It performs all screen displays and keyboard input through programmer defined codes. Operator keyboard input errors are eliminated through data checking routines.

The forty-plus programming routines are designed to assist the BASIC programmer in structuring programs and performing similar functions at the same BASIC line numbers each time programs are developed. Using these routines, the programmer can choose the functions needed for each particular program. All routines interact with the Screen/Keyboard Manager. (List Price: \$49.95)

Requires: 64K, one disk drive, 80-column monochrome display, 80 cps Matrix printer, BASICA.

SimSoft, Inc.
1258 17th St.
Marysville, MI 48040
(313) 364-7241

CIRCLE 669 ON READER
SERVICE CARD

The Informer

A program designed to provide the user with disk directory information. It also allows for visual file name changes and enables the user to change file attributes for hiding and retrieving files.

The program uses a machine language routine linked with a BASIC program to gain access to the DOS disk directory. This routine reads and writes the directory and makes the physical changes to the file names and attributes.

Certain routines display all directory information either on the screen or on the printer. This information includes file name, file attributes, date created or last updated, the time of the last update, the file's starting side/track/sector location, and the file size. The program also shows the number of entries used, the number remaining, the total bytes used for files, and the number of bytes remaining for files.

Operating system files are provided, as well as data files. (List Price: \$29.95)

Requires: 64K, one disk drive, 80-column monochrome display, 80 cps Matrix printer, BASICA.

SimSoft, Inc.
1258 17th St.
Marysville, MI 48040
(313) 364-7241

CIRCLE 668 ON READER
SERVICE CARD

The Depreciator

A menu-driven program that prepares depreciation schedules according to the Accelerated Cost Recovery System, a series of tax law changes that went into effect in 1981. This program has calculation and print routines for three, five, 10, and 15 year tangible property. Schedules are printed to illustrate monthly detail with totals shown for each year.

The monthly depreciation expense amount and the accumulated depreciation are shown, as is the net book value. (List Price: \$39.95)

Requires: 64K, one disk drive, 80-column monochrome display, 80 cps Matrix printer, BASICA.

SimSoft, Inc.
1258 17th St.
Marysville, MI 48040
(313) 364-7241

CIRCLE 670 ON READER
SERVICE CARD

MICROMAGIC

With this program, users can downline load numeric and textual data to disk in VisiCalc format. Once the data has been downline loaded, it can be transferred onto the VisiCalc worksheet and manipulated with the standard VisiCalc commands. (List Price: \$150)

Requires: 64K, one disk drive, IBM asynchronous communication disk.

I.P. Sharp Associates
2 First Canadian Pl. #1900
Toronto, Ontario
Canada M5X 1E3
(416) 364-5361

CIRCLE 665 ON READER
SERVICE CARD

INTELLICOM

A menu-driven, intelligent communications software package that provides computer-to-computer communications from both terminal emulation and file transfer standpoints. Several file transfer protocols are supported, facilitating transmission of binary and ASCII data. Error detection and recovery schemes exist for those applications where data integrity is paramount.

Intellicom fully supports the protocols used by The Source and CompuServe.

Intellicom supercedes STERM, and the manufacturer offers current owners of STERM an upgrade to INTELLICOM for a minimal fee. (List Price: \$150)

Requires: 64K, one disk drive, PC-DOS.

Computer Toolbox Inc.
1325 E. Main St.
Waterbury, CT 06705
(203) 754-4197

CIRCLE 667 ON READER SERVICE CARD

THE PROTECTOR

A disk copy protection system designed for use by software publishers and authors. The program can duplicate and copy-protect any type of DOS file, including interpretive BASIC programs. Each disk is serialized. The areas of the disk that hold DOS are unprotected so that the bootable system disk can be created by the end-user. One disk is capable of duplicating 1,250 disks. (List Price: \$250)

Requires: 64K, two disk drives.

Logical Systems Corporation
Route 1, Box 253
St. Michael, MN 55376
(612) 497-3861

CIRCLE 681 ON READER SERVICE CARD

Investment-Master/PC

An investment portfolio management tool featuring record keeping and control for a portfolio of up to 2,000 different investments. It also provides reports of capital gains and dividend income and portfolio valuation, and handles multiple purchases of the same investment, certificate numbers, and ownership information. (List Price: \$199)

Requires: 64K, 1 disk drive, 80 column monitor. Printer recommended.

Alro Computer Software Services
3100 E. High St.
P.O. Box 927
Jackson, MI 49204
(517) 787-2204

CIRCLE 680 ON READER SERVICE CARD

Order Prospector

A menu-driven job-specific microcomputer software package designed to help sales managers increase sales productivity by providing prospecting data, encouraging sales followup, and reducing clerical work.

The program stores information on sales prospects, including customer name, product, potential order amount, probability of sale, and current status; and it develops a six-month projection of order volume. A summary report lists projected monthly volume for each territory. Current data is displayed for each territory reviewed and is revised instantly as conditions change. Up to 33 territories and 1,500 prospective orders can be stored on each data disk. (List Price: \$195; a demo disk is available for \$25)

Requires: 48K, one disk drive, 80-column continuous-feed printer.

MASCO
5963 Tulane St.
San Diego, CA 92122
(619) 453-8758

CIRCLE 685 ON READER SERVICE CARD

DATA ACE

A relational database management system that unleashes the power of mainframe systems to microcomputers using a block-structured Forth-based programming language, DML. The query language DIL provides full relational access to the database. The DDL mode allows dynamic definition and redefinition of the data dictionary.

A CATALOG mode facilitates entering of programs (DML), procedures (DIL), and text, and includes a full screen editor.

DATA ACE syntax is consistent in all modes. The communications interface is TRANSMIT and RECEIVE.

(List Price: \$850)

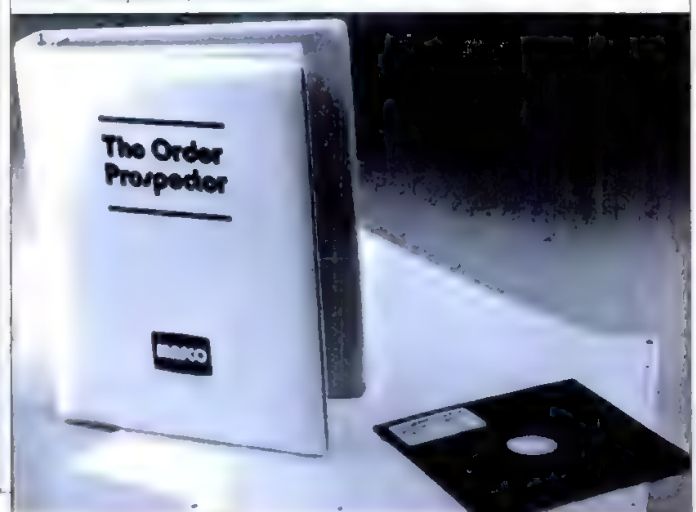
Requires: 64K, CP/M-86 or PC-DOS.

Computer Software Design, Inc.

1911 Wright Circle
Anaheim, CA 92806
(714) 634-9012

CIRCLE 666 ON READER SERVICE CARD

Order Prospector, MASCO



New On The Market

PLOT4

A menu-driven graphics program for generating custom color X-Y plots having linear or logarithmic axes. Items on the menus include a main title, X and Y axis titles, line captions, a data column pair for each line, line types, axis limits, tick increments colors, and several other control flags and parameters. Plot data can be typed directly into columns displayed on the screen.

Up to nine lines can be included in the graph and each line can have one of five different line types. Captions for up to four of the lines can be automatically displayed below the plot frame. A four-point interpolation option can be selected to smoothly connect the data points. Lines are clipped at the frame borders.

Colors can be individually selected for almost every component of the graph, including the background color, colors for each line, colors for the titles, line captions, numeric axis labels, and the plot frame.

The user can save the menu contents and plot data on disk by using the PLOT4 library maintenance commands. The completed graph can be saved on disk or transferred directly to an Epson or IBM printer with GRAFTRAX. (List Price: \$79.95)

Requires: 64K, color/graphics adapter, 40-column display, PC-DOS.

Carnegie Software
P.O. Box 1752
Redondo Beach, CA 90278
(213) 374-0550

CIRCLE 686 ON READER SERVICE CARD

Property Accounting System (PAS)

A menu-driven system that provides financial information on apartment properties. Property owners and managers can use this system to design their own chart of accounts and manage up to 30 properties with 50 to 2,500 units.

PAS features integrated payroll, automatic check printing, transaction records, income statements, balance sheets, monthly operating reports, quarterly payroll reports, and monthly and year-to-date figures. It also includes an instruction manual designed for novice computer users who are familiar with property management terms. (List Price: \$1,000)

Requires: 192 to 256K, two disk drives, printer.

Freeman Systems
7 Sunset Lane
Menlo Park, CA 94025
(415) 854-7399

CIRCLE 688 ON READER SERVICE CARD



MIRRORGRAPH

A menu-driven graphics system that enables the user to construct bar graphs, pie charts, and multiple line graphs from raw data. An optional monthly axis allows the user to represent up to 13 months worth of data on a single graph for the purposes of preparing annual reports and presenting yearly statistical data.

All graph-construction routines include a comprehensive audio/visual error-checking system. Once created, the graphs can be stored onto a disk or printed out on a dot-matrix printer. (List Price: \$59.95)

Requires: 64K; printer required for hard copies, color monitor recommended.

Mirror Images Software, Inc.
1223 Peoples Ave.
Troy, NY 12180
(518) 274-2335

CIRCLE 687 ON READER SERVICE CARD

XF-DUMP

A general purpose utility program designed for programmers and experienced users who want to display and alter the contents of existing files. The program is capable of handling all known file structures and absolute sectors on a disk. All data is displayed in its character and in its hexadecimal representation.

When a record is displayed, any of the on-screen data can be altered. To change a record, users key over the current data in either the character or hexadecimal fields. The change is then copied to the record in storage. When all changes are completed, they can be saved back to the disk to make them permanent.

Other program features are: full screen support, random and sequential file support, forward and backward paging, record selection by range, constant display of current track, sector, head and absolute sector for a file, and direct output to the display or printer. (List Price: \$35)

Requires: 64K, two disk drives, 80-column display, PC-DOS.
Distributed Software Systems
P.O. Box 1301
Northbrook, IL 60062
(312) 634-1511

CIRCLE 635 ON READER SERVICE CARD

PRODUCT
INFORMATION

CHAT

CONFERENCING



1200 BAUD/300 BAUD

ELECTRONIC
MAIL

ORDERS

SOFTWARE
EXCHANGE

HOSTCOMM

by JANADON

\$170.00

The Complete Host Communications System

★Features:

- The first Host communications system for the IBM Personal Computer
- Run programs from a remote site with a terminal or another computer
- Use as a personal communications system or electronic mailbox
- Full Upload/Download facility for ASCII files
- Easy set-up, installation, and especially easy to use
- Full system operator support
- Three level password protection
- Unattended operation

ADD-ON FEATURES for HOSTCOMM

- PCE-MAIL** — designed to allow Hostcomm users to leave messages and correspondence for other users. Passwords permit privacy, "wildcard" addresses permit generalized mail. Help files provided. **\$80.00**
- CONFERENCING** — make your Host the most popular system in town. Choose up to 12 different topics for your users. One menu can be used to control both PCE-MAIL and CONFERENCING. **\$80.00**
- HOST UTILITIES I** — a series of 4 utilities for use with HOSTCOMM. MENU-MOD simplifies menu management. Other options compute file sizes and transmit times, list menus and filespecs. **\$49.95**
- HOST UTILITIES II** — HOSTMENU permits alteration of a Download Menu, or changes to a higher number menu. HOSTFILE uses a password scheme so that only certain callers may download files. **\$49.95**
- ORDER TRANS** — a program used with HOSTCOMM to provide callers with information about your products. Product descriptions are contained in a separate file for easy modification. Pertinent order information may be requested and stored from callers. **\$39.95**

★Minimum Systems Requirements:

- 128KB System Unit
- 320KB Diskette storage (1 or 2 drives)
- PC-DOS 1.0 or 1.1
- Printer
- Asynchronous Communications Adapter
- Hayes Stack™ Smartmodem 300 or 1200
- Video Display (40 or 80 characters)

NF SYSTEMS, LTD.
P.O. Box 76363, Atlanta, GA 30358

404-252-4146 — DATA 404-252-3302 — VOICE
Add \$2.50 for postage and handling

IBM®
Personal Computer

VISA/MASTERCARD

Catalog Available

CIRCLE 344 ON READER SERVICE CARD

PC MAGAZINE 513 APRIL 1983

New On The Market

BANCWARE

A series of software modules designed for the banking community. This package calculates commercial and installment loans, and will print all necessary forms required for closing.

The user is prompted for all information necessary for payment and APR calculations. Once these have been made, the user is prompted for customer and collateral information.

Since the system saves the loan record on disk, all loan forms can be printed, changed and re-printed once or multiple times. (List Price: \$595)
Requires: 64K, two disk drives, PC-DOS, printer.
MCS, Inc.

2715 E. 3300 South
Salt Lake City, UT 84109
(801) 486-8746

**CIRCLE 690 ON READER
SERVICE CARD**

Financial Management Models

The programs consist of *VisiCalc* financial templates designed to assist the owner or manager of a service firm determine billing rates, monitor billable time, invoice clients, budget projects, and plan staff assignments.

The package also includes a 175-page manual in a three ring binder with written instructions. Each template is explained in detail and a glossary of financial terms is included. (List Price: \$295)

Requires: 64K, one disk drive, printer, *VisiCalc* program.
Pro/Pac, Inc.
14925 Memorial Dr., #105
Houston, TX 77079
(713) 496-1179

**CIRCLE 689 ON READER
SERVICE CARD**

Superfile System 3

A program that provides for updating and automatic re-indexing of up to 65,000 records per data base. Each free format, variable length record can have up to 500 of the user's own key words as descriptors, with a maximum of 32,000 key words per data base.

Users can cross-index and retrieve records by linking up to 128 key words with "and," "or," and "not," and search up to 255 floppies or hard disks per data base.

The software prompts them to insert the correct disk before retrieval, with optional output to screen, printer, disk file or any combination of the three.

The program includes a second program from the manufacturer, *Post Haste*. The *Post Haste* program works with *Superfile* or *Micropro's Mail Merge* to allow users to format and print mailing labels, envelopes, membership lists, and other information. The *Post Haste* program sorts information alphabetically or by zip code. (List Price: \$295)
Requires: Two disk drives, or hard disk, DOS.

FYI, Inc.
P.O. Box 26481
Austin, TX 78755
(800) 531-5033
(512) 346-0133

**CIRCLE 616 ON READER
SERVICE CARD**

Optimum-Sort

A general purpose sort/merge utility program that features the ability to sort or merge files containing fixed or variable length records for a variety of data types.

Up to five files can be sorted or merged at one time and nine control fields can be specified. File size is limited only by available disk space. The program is written in assembly language and uses a sorting algorithm. The program can be run from the keyboard or as a batch command. (List Price: \$75)

Requires: 48K, one disk drive, DOS.

Optimum Data Processing
P.O. Box 2167
Humble, TX 77347
(713) 454-7428

**CIRCLE 612 ON READER
SERVICE CARD**

Business Planner

A modeling program that provides a simulated model of the user's business. By projecting monthly income and expense figures, budget allocations, and sales forecasts, users can analyze underlying assumptions in depth. Management decisions can be tested.

The program combines projects into alternative models to predict future growth. An illustrated manual is also provided. (List Price: \$395)
Requires: 64K, two disk drives, IBM color monitor, or monitor equipped with IBM color graphics card, UCSD P-system.

Duosoft Corporation
1803 Woodfield Dr.
Savoy, IL 61874
(217) 356-3111

**CIRCLE 617 ON READER
SERVICE CARD**

Financial Management Models, Pro/Pac, Inc.



QWIK-KEY, QWIK-GUIDE, QWIK-LABEL

Three separate accessories for use with the PC. QWIK-KEY is a plastic overlay card that fits around the PC's function keys. The card can be marked to indicate each key's usage for a particular program. The QWIK-GUIDE consists of a pair of plastic reference cards that contain all DOS commands, BASIC error messages and CONTROL/FUNCTION key information. The QWIK-LABEL is a set of 18 self-adhesive labels that identify the plug-in cards, knobs and connectors on the front and rear panels of the PC. Blank labels are also included. (List Price: \$4.50 QWIK-KEY, \$3.25 for set of two QWIK-GUIDES, \$1 QWIK-LABEL, \$7.75 complete set)

Compu-Quote
6914 Berquist Ave.
Canoga Park, CA 91307
(213) 348-3662

CIRCLE 638 ON READER SERVICE CARD

Model SL

A plug-in protector designed to clean incoming powerlines of overvoltage transients and spikes. The unit will plug directly into any grounded 110 volt outlet and accepts all standard, three-pronged plugs.

An instant reset provides continuous, uninterrupted protection. (List Price: \$99)
Transtector Systems
E. 5250 Seltice Wy.
P.O. Box 1299
Post Falls, ID 83854
(800) 635-2537

CIRCLE 625 ON READER SERVICE CARD

CompuCovers

Custom-fitted, static-free computer dust covers available in tan or black cloth-backed vinyl and clear plastic. The covers are made to fit any size computer equipment. All covers are available with the customer's own logo. (List Price: \$3.95 starting price)

CompuCover
P.O. Box 324
Mary Esther, FL 32569
(800) 874-6391
(904) 243-5793

CIRCLE 634 ON READER SERVICE CARD



PC Transit Case, Fiberbilt

HEAD Disk Drive Cleaning Kit

A cleaning kit that removes contaminating debris from the computer drive head without removing or disassembling it and without abrasion. Each kit includes all of the necessary cleaning equipment with illustrated instructions. The cleaning solution comes with a controlled dropper tip dispenser. A limited five-year warranty is provided. (List Price: \$34.95)
Casa Graphics
1401 Dorothy Dr.
Glendale, CA 91202
(213) 245-4355

CIRCLE 636 ON READER SERVICE CARD

PC Transit Case

Two light-weight transit cases composed of fibrex with heavy-duty aluminum frames, steel corners, and fully padded interiors.

Case #18314 holds the CPU and keyboard, while case #18315 holds the IBM monitor and MX-80 printer. (List Price: \$161 case #18314, \$171 case #18315)
Fiberbilt
601 W. 26th St.
New York, NY 10001
(800) 847-4176
(212) 675-5820

CIRCLE 643 ON READER SERVICE CARD

QWIK-KEY, QWIK-GUIDE, QWIK-LABEL, Compu-Quote



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14925 Memorial Dr., #105
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(713) 496-1179

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(213) 348-3662

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(904) 243-5793

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SERVICE CARD

QWIK-KEY, QWIK-GUIDE, QWIK-LABEL, Compu-Quote



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Fiberbilt
601 W. 26th St.
New York, NY 10001
(800) 847-4176
(212) 675-5820

CIRCLE 643 ON READER
SERVICE CARD

New On The Market

Glare/Reflection Reducing Filter

A micro non-filament fiber screen that mounts either externally or internally on an IBM monochrome display. The filter will reduce glare and reflection by up to 87%. It is available in five different densities of cloth, including two manufactured especially for color video displays. (List Price: \$65 for color terminals, \$60 for non-color terminals)

PROSOFT

P.O. Box 4391
Marion, CT 06444
(203) 621-9331

CIRCLE 627 ON READER
SERVICE CARD

TOUCH-TILT

An ergonomically designed video pedestal that allows the PC monitor to be tilted or swiveled. The pedestal has a 15 degree tilt, and 360 degree rotation allowing two users to share the same monitor. Pedestals come in three colors and range in size from 12x12 to 16x20. (List Price: \$59.95 to \$69.95)

Donnay Technology
16669 Evergreen Circle
Fountain Valley, CA 92708
(714) 839-4255

CIRCLE 637 ON READER
SERVICE CARD

TOUCH-TILT, Donnay Technology



The Computer Escort, FMJ, Inc.

Expansion Memory Boards

Memory boards which can be configured from 64K to 512K on 64K boundaries. Each comes with a card guide and a rear mounting bracket. Smaller memory boards can be field retrofitted to up to 256K. (List Price: MEM64, \$295; MEM128, \$385; MEM192, \$470; MEM256, \$555; 64K expansion for MEM64, MEM128, or MEM192 boards, \$110)
Maynard Electronics
P.O. Box 3322
Longwood, FL 32750
(305) 869-8058

CIRCLE 677 ON READER
SERVICE CARD

The Computer Escort

A storage unit designed for the PC. The unit consists of a low profile bottom shelf unit which allows storage of the keyboard behind a locked door, a bottom removable adhesion plate to secure the unit to a table top, a removable adhesion plate for securing the computer, a removable rear cover for storage of excess cables and accessories, and an optional Power Sentry which includes transient suppression with four AC outlets controlled by a key switch. Security brackets protect the plug-in cards inside the PC by restricting removal of the cover. Another option is a stacking shelf which is designed to bolt to the bottom shelf or can be set alongside for monitor, printer, or extra disk drives. (List Price: \$155)

FMJ, Inc.

P.O. Box 5281
Torrance, CA 90510
(213) 325-1900

CIRCLE 676 ON READER
SERVICE CARD

CTC Cable System

A component cable system that provides all parallel computer/printer interfaces. It includes a cable section that conforms to the computer and a snap-on connector that adapts it for the specific printer. A printed circuit board in the connector can be used for absolute line skewing. (List Price: \$26 for 5-foot cable, \$30 for 10-foot cable, \$30 for connectors)

CTC Electronics
Division of Communications
Technology Corp.
2237 Colby Ave.
Los Angeles, CA 90064
(213) 477-4283

CIRCLE 639 ON READER
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New On The Market

ACCESSORIES

Calc/Pad

A layout pad for electronic spreadsheet users. Each cardboard-backed pad contains fifty $8\frac{1}{2} \times 11$ sheets. The green-tinted paper is erasable and punched for three-ring binders. Space is provided for required text, values, or formulae. (List Price: \$4.75 + .90 shipping)

Compu-Quote

6914 Berquist Ave.

Canoga Park, CA 91307

(213) 348-3662

CIRCLE 626 ON READER
SERVICE CARD

GRIDS

A software enhancement product to simplify the process of incorporating graphic data in a word processor text file. The package includes over 50 of the most commonly used graph paper formats with instructions on how to create hundreds more. (List Price: \$23)

ATC Software

Rt. 2

Box 448

Estill Springs, TN 37330

CIRCLE 572 ON READER
SERVICE CARD

How To Use WordStar

A series of three audio cassette lessons, requiring about two hours each, to teach the rudiments of the WordStar word processing system. The listeners learn to create, edit, reorganize, merge, format, save, and print their own documents.

The course also includes a fully-indexed User's Guide that summarizes all key ideas and procedures from the lessons. With the need for reading and note-taking eliminated, the learner is free to concentrate on the screen and keyboard, trying each command and seeing the results.

The program provides for optional reinforcement at key points in each lesson and works on any standard audio cassette player—no computer hookup is required. (List Price: \$49.95)

Requires: Same as WordStar.
Fliptrack Learning Systems
A Division of Mosaic Media, Inc.

526 N. Main St., Box 711
Glen Ellyn, IL 60137
(312) 790-1117

CIRCLE 580 ON READER
SERVICE CARD

Templates

Three templates that fit on the PC's pencil ledge. The templates contain command references for debug, EasyWriter, and WordStar. (List Price: \$8.99)

E.T. Templates
2921 Mishawaka Ave.
South Bend, IN 46615
(219) 234-0069

CIRCLE 564 ON READER
SERVICE CARD

PC 4-PACK

A four-function memory expansion board with standard 64K-256K bytes of memory, an asynchronous RS 232C communications port, a real time clock/calendar, and a parallel printer port.

All memory chips are socketed and expandable in 64K increments up to 256K. Automatic parity insertion and verification is included. On-board DIP switches provide selective addressing on any 64K rows.

The RS 232C communications port includes a standard DB 25-pin connector and is software programmable for baud rate, word length and stop bits. Jumper selection allows port to be addressed as COM1 or COM2. This adapter can also be used for connecting any serial devices such as modems and RS 232C printers.

The real time clock/calendar includes a non-stop battery that runs even when the computer is off. The parallel printer port feature comes equipped with cable, standard Centronics connector and protocol. Jumper selection provides configuration of LPT1 or LPT2 without interfering with the operation of the standard parallel printer port on the monochrome board. (List Price: \$395)

DATA Impact Products, Inc.
745 Atlantic Ave.
Boston, MA 02111
(617) 482-4214
Telex: 95-1047

CIRCLE 569 ON READER
SERVICE CARD

COMPU-TABLE

A home-use computer table to organize disk drives, monitor, printer, keyboard, and manuals into one space-saving area.

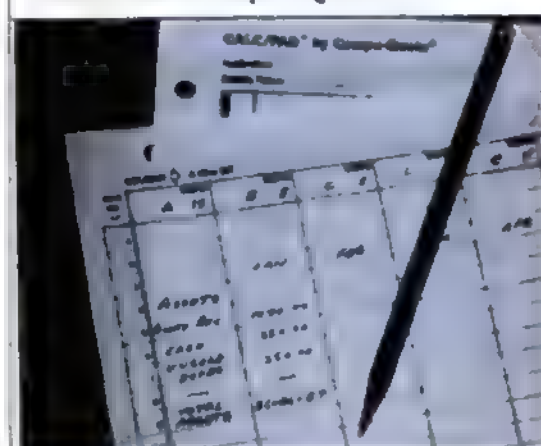
Constructed with steel tubular framing and woodgrain tops, the table features a built-in printer slot, built-in cord and ribbon slot for flush-to-wall fit and tangle-free wires. Its 27-inch height makes keyboarding comfortable.

Available options include a DATATOP shelf for storage of programs, manuals, disks, and printouts; a Disk Bay; a light that fits under the Datatop to provide a direct light source, and a matching printer stand. (List Price: From \$53.95)

Compco Industries, Inc.
159 West Walnut St.
Painesville, Ohio 44077
(216) 354-4186

CIRCLE 584 ON READER
SERVICE CARD

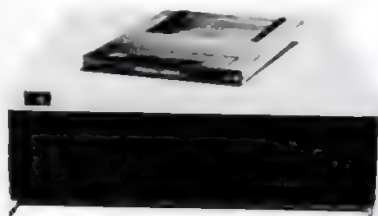
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(312) 579-0672

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BC SYSTEMS INC.

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LaGrange Park, Illinois 60525
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CIRCLE 175 ON READER SERVICE CARD

EDITED BY SUSAN HURLEY

Clubs, bulletin boards, and newsletters enable PC users to capitalize on their fellow users' knowledge.

Club News

PC User Groups

This list provides the names and addresses of PC User Groups worldwide. You can check this list to locate other PC aficionados in your area.

ALABAMA

Birmingham User Group
Chet Ellis
ComputerLand
215 W. Valley Ave.
Birmingham, AL 35209
(205) 942-8085

ALASKA

Anchorage User Group
Mark Bolzern
c/o General Computer Services
213 W. Sixth Ave. #11
Anchorage, AK 99501

ARIZONA

The Phoenix IBM PC Users Group
Fred Linch
P.O. Box 44218
Phoenix, AZ 80564
(602) 954-7519

IBM PC Idea Exchange
Lisa May
United Systems Corporation
1074 E. Sandpiper Dr.
Tempe, AZ 84283
(602) 831-9363

IBM PC User Group
Theresa Baudier
P.O. Box 1489
Tucson, AZ 85701
(602) 622-4751

CALIFORNIA

Sacramento IBM PC Users' Group
2844 Wright St., #135
Sacramento, CA 95825

San Diego IBM User Group
Michele Albright
4005 Isle Dr.
Carlsbad, CA 92008
(714) 434-1608

San Diego Computer Society
John Field
1384 Caliente Loop
Chula Vista, CA 92010
(714) 421-9686

IBM PC User Group
Lee Wersel
7255 Orchard Dr.
Gilroy, CA 95020

Beach Cities IBM PC Users Group
Phil Root
6242 Moonfield Dr.
Huntington Beach, CA 92648
(714) 847-6369

Modesto-Turlock PC User Group
Liz Leedom
Box 1122
Modesto, CA 95353
(209) 523-4218, 578-2358

IBM Users Group of California
Neil Zachary
P.O. Box 4136
Los Angeles, CA 90028
(213) 937-1314

PC will publish a periodic listing of PC user groups and their activities. Drop a line to Club News, PC, One Park Ave., New York, NY 10016.

Business Computer

Users Group
David Nussbaum
c/o Software Central
650 E. Colorado Blvd.
Pasadena, CA 91101

Diablo Valley PC

Alfred Hunt
P.O. Box 23764
Pleasant Hill, CA 94523
(415) 687-8037

Adventurers Anonymous

Michael Eddy
P.O. Box 8286
Rancho Santa Fe, CA 92067

Cubic Computer Club

Pete Nelson
P.O. Box 80787
San Diego, CA 92138
(714) 453-4953

San Francisco IBM PC User Group

Alfred Goodwin
Software Center
4720 Geary St.
San Francisco, CA 94118
(415) 751-2231

U.C. San Francisco User Group

Bruce Stegner
UCSF U-76
San Francisco, CA 94143
(415) 666-1409

PC Club

Max Brioski
1880 California St. #12
San Francisco, CA 94109
(415) 775-8882

Pomona Valley IBM-PC User Group

Roy Livingston
10282 Felipe St.
Montclair, CA 91763
(714) 624-9194

Bay Area User Group

Christian Du Lac
P.O. Box 155
San Francisco, CA 94101
(415) 668-4647

Santa Barbara City College Computer

Science Department
Stu Swartz
721 Cliff Dr.
Santa Barbara, CA 93109
(805) 966-2919

Silicon Valley Computer Club

Peter Harris
510 Lawrence Expressway
P.O. Box 686
Sunnyvale, CA 94086
(408) 248-9057

San Fernando IBM PC Users Group

David Nussbaum
11558 Riverside Dr. #207
North Hollywood, CA 91602

Peninsular IBM PC Users Group

c/o Friendly Software Corp.
376 El Camino Real
San Carlos, CA 94070

Greater South Bay IBM PC Users Group

P.O. Box 665
Lomita, CA 90717
(213) 325-7533

Thousand Oaks Personal Computer Club

(TOPCC)
c/o ComputerLand
171 E. Thousand Oaks Blvd.
Thousand Oaks, CA 91360

COLORADO

Denver User Group

Steve Leibson
4040 Greenbriar Blvd.
Boulder, CO 80303
(303) 494-4062

PC Users Group

Cleveland L. Bell
17665 Shahara Rd.
Monument, Colorado 80312
(303) 488-3049

CONNECTICUT

IBM Personal Computer User Club of

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Dave Foulger
69 River St.
New Caanan, CT 06840
(203) 966-9378

IBM PC Club

Colette B. Squires
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Storrs, CT 06268

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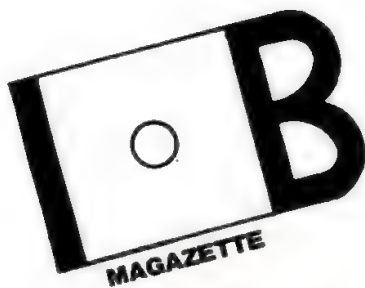
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3601 N. Military Trail
Boca Raton, FL 33431

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6700 23-B Roswell Rd.
Atlanta, GA 30328

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Doug Long
P.O. Box 22967
Honolulu, HI 96822

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Bruce Burns
ComputerLand
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Boise, ID 83702
(208) 344-5545

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Barrington, IL 60010
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Fort Wayne, IN 46825
(317) 259-7892

IBM PC Users Group, Inc.

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Indianapolis, IN 46268

Northern Indiana IBM PC Users Group

Dr. Terry Alley
316 N. Ironwood Dr.
South Bend, IN 46615
(219) 289-5506

IBM PC User Club

Jo Spangler
Microbase Software, Inc.
P.O. Box 40353
Indianapolis, IN 46240
(317) 877-4304

South Bend PC Club

Thomas R. Lafree
19525 Cleveland Rd.
South Bend, IN 46637
(219) 277-3344

IOWA

Cedar Falls User Group

Lee Ann Moore
Black Hawk Village Shopping Center
Cedar Falls, IA 50613

IBM PC Users Group

P.O. Box 246
Des Moines, IA 50301
Attn: Gary Wilcox
(515) 967-5880

KANSAS

Topeka Library User Group

Becky Hinton
Topeka Public Library
515 W. 10th St.
Topeka, KS 66604

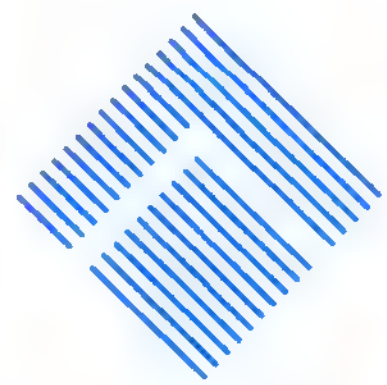
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Metairie, LA 70002

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Baltimore, MD 21220

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Lutherville, MD 21093
(301) 337-5555

Baltimore IBM PC Users Group
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Jarrettsville, MD 21084

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MMS-Forth
Miller Microcomputer Services
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Natick, MA 01760
(617) 653-6136

IBM PC Users Group
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Boston, MA 02108
(617) 367-8080

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P.O. Box 1014
Heritage Sq.
Belchertown, MA 01007

MINNESOTA

Minneapolis User Group
Peter LeNeau
100 N. 6th St.
Minneapolis MN 55403
(612) 339-3233

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Jennifer DuPont
5571 E. Rocky Mountain Ave.
Columbia, MO 65201
(314) 474-1773

NEW JERSEY

Personna Computer Association, Inc. The
Int'l Association for Users of the PC
Larry Collison
P.O. Box 759
Point Pleasant, NJ 08742
(201) 840-0300

North Jersey IBM PC Club
Irving Lang
7 West 45th St.
New York, NY 10036

NEW YORK

QNPC
Nathan Chao
Dept. of Computer Technology
Queensborough Community College
Bayside, NY 11364
(212) 631-6207

East Coast Club
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ComputerLand
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Carle Place, NY 11514
(516) 742-2262

NYPC: The NY IBM Personal Computer
Users Group
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Utah Blue Chips

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Capitol PC

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The Central Virginia User Group

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WASHINGTON

The PNW IBM User Group

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WISCONSIN

Madison IBM-PC User's Group

Philip J. Niehoff
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Madison, WI 53701
(608) 255-7641

CANADA

Personal Computer Association (PCA)

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L1S 3C3 Canada
Telex: 06-986766

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L7L 5B2 Canada

The IBM User Group of Toronto

Tony Bagshaw
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Downsview, Ontario
M3H 5V6 Canada

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Gerry Danen
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T5W 4S9 Canada

British Columbia User Group

Warren McKay
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Victoria, BC
V8T 4G8 Canada

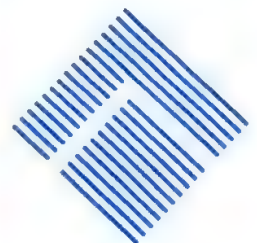
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CIRCLE 570 ON READER SERVICE CARD

PC-DOS provides a collection of utilities to handle such procedures as batch processing, disk formatting and copying, date stamping, and file handling. Users often find, however, that they need to perform other similar operations that are not supported by IBM's operating system. In the past few months, there has been an explosion of new software to take up the slack.

Cortland's PC-System Utility Pak touts one of its modules as a program that "may be the most valuable addition to your software library." Well, not quite. The package does contain a bit copier to make backup copies, an alphabetical DOS directory, a print spooler, a program lister, and a program to switch back and forth from color to monochrome monitors. But if this is the best software in your library, you must only be using your PC to hold down

papers so they don't blow off your desk.

Two for the Money

For \$79.95, you get one standard issue zip-lock plastic bag, one folded gray cardboard table of contents, two slightly different six-page instruction booklets, and one scrap of paper containing a correction. Why two instruction booklets? Good ques-

IF YOUR
*listings are crying out to
have the day of the
week printed on them,
grab this program.*

tion. One version says that the print spooler will work with only the IBM printer. The other claims it will work with "most printers." One booklet comes with little pictures. The other does not. One mentions that entering a name incorrectly will crash the system. The other relies on a

sliver of loose paper to tell you this. Perhaps one booklet is version 1.1 of the manual. If so, why include both?

The copying module is very much like the one sold by Norell Data Systems. If you can't sleep at night because you're afraid a freak magnetic storm will pass through your office and turn all your copy-protected disks into frisbees, this can help. Although it will make backups of some software that confounds the DOS diskcopy command, it is stymied just as easily by clever copy-locking schemes.

Better Arrangements

The directory organizer claims to be "much more powerful and user-friendly" than its DOS counterpart. The only real difference is that the DOS directory isn't alphabetized and hugs the left edge of your screen. If your disk contains more than 25 files, DOS will scroll some off the top of the screen as it displays new ones at the bottom. Cortland's directory, on the other hand, displays your files in two fat columns, allowing you to cram twice as many files onscreen at once. Although this is handy, a Freeware directory utility called SDIR not only sorts in the Cortland

fashion, but arranges your files by extension, date, or size, and includes any files hidden on your disk.

Wrap-Around

The print formatting module reminds me of the useless small appliances, like blenders with heaters in them, that people give as wedding presents to young couples they don't know. The formatter takes a perfectly good program listing, puts a second set of consecutive numbers in front of line numbers that are already there, then centers the whole works on the page. If you have lines that just barely fill a standard 80-column screen, this program will wrap the last few letters of each onto the next printed line, which looks terrible. And while it claims to print out text files, it massacred several of mine. To its credit, PC-System Utility Pak breaks the listings at the page perforation. It also stamps each page with the name, page number, date, and day of the week. If your program listings are crying out to have the day of the week printed on them, grab this program. An improved version is also being offered

elsewhere as a Freeware program.

Coincidence?

The print spooler works fairly well, except that when it's loaded, the print head jumps spasmodically across the page

CORTLAND'S
directory displays your
files in two fat columns,
allowing you to cram
twice as many files
onscreen at once.

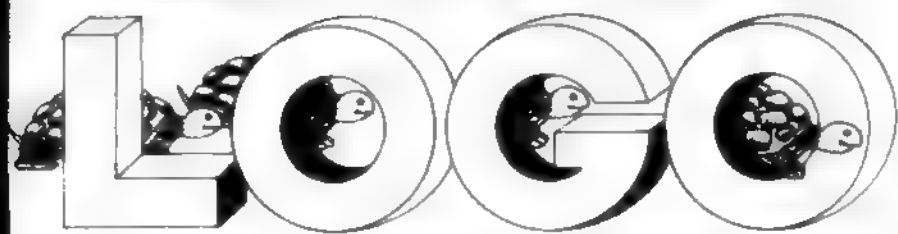
and back from time to time, leaving little rows of aitches in its wake. To load the spooler, instead of entering SPOOLER, PS, or SP, you have to type in SM-N14. Type in that cryptic command incorrectly and the system hangs. In addition, the instruc-

tion book properly advises you how to add this program to an AUTOEXEC.BAT file. Funny thing—a variation has been available for months as a Freeware program. Do these coincidences seem odd to anyone else?

The fifth program on the disk lets you zip back and forth between color and monochrome monitors. It is not being distributed elsewhere as a Freeware program; instead, IBM is giving it away—as in free. The freebie version we use around the office works in both DOS and BASIC, the Cortland version works only in DOS.

True, the four modules in this package are useful. But they are no better than other programs on the market, and in several cases, they are plagued with unfriendly or incomplete features. If you want to shop around and hunt down the superior versions, you'd be better off. If you prefer the convenience of having them all in one place, however, you might want to consider giving this a try. Still, \$80 is a lot for second-class software, and this package isn't going to make it into the disk Hall of Fame. /PC

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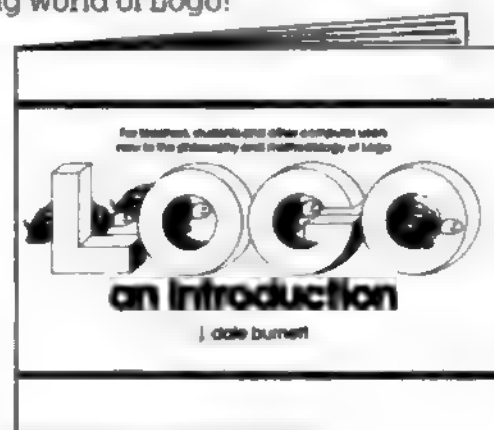
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EDITED BY COREY SANDLER

Insights, tips, and occasional bugs, as reported by the PC-user community.

User-To-User

This month's contributions from users feature good old American (and Canadian) ingenuity. You'll read about ways to help you remember the name of your current VisiCalc file and ways to help your computer remember a picture. You'll find out how to give your printer a cheap pair of legs and your PC an inexpensive diskless memory. But first, a little device from a BASIC programmer who wanted to keep his listings in order.

An Adjustable Feast

Here is a technique I have found useful when developing long BASIC programs. It is irritating trying to keep track of the starting line number of each module or subroutine in order to list it for viewing or modification. It's especially rough when frequent renumbering is made necessary by adding lines within each module.

The solution I found has been to write a self-adjusting, executable index at the start of the program, like this listing (see Figure 1):

Now, when I want to view any subroutine, I just enter List -200. I look at the line number of an indexed subroutine (say,

line 190 for the Text Bordering subroutine) and then enter RUN 190 to get an instant listing of the module on the screen. The beauty of this process is that the listing numbers change automatically to keep track of the modules and subroutines during the Renum process. Finally, after the BASIC program is fully developed, this module index can be deleted.

Bob Baillie
Montreal, Quebec, Canada

An Audio Fan

Since most PCs are sold with disk drives, the cassette recorder interface has become something of an orphan. There is very little software, if any, to run with it, and documentation is scarce. The IBM Technical Reference Manual leaves you staring at a picture of a 5-pin DIN connector and that's it.

And to make things worse, IBM does not sell a cassette recorder or even a cable that will interface to one. The local IBM dealers were not the least bit helpful to me, either. Here is what I found by myself:

The cable you need may be purchased

Figure 1: Sample of a self-adjusting executable index, written by Bob Baillie.

```
10 GOTO 210
20 CLS: LIST 600-800 : STOP REM EXECUTIVE
30 CLS: LIST 770-970 : STOP REM OPTION 1. ENTRY MODE
40 CLS: LIST 980-1180 : STOP REM OPTION 2. SORT & DISPLAY
50 CLS: LIST 1190-1270 : STOP REM OPTION 3. HARD COPY
60 CLS: LIST 1280-1480 : STOP REM OPTION 4. MAIN PROG MENU

190 CLS: LIST 3000-3200: STOP REM TEXT BORDERING SUBROUTINE
200 CLS: LIST 3400-3600: STOP REM CLEAR COLUMN SUBROUTINE
210 REM START OF PROGRAM
```

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from Radio Shack. It's called the Radio Shack Color Computer-Audio Cassette Interface. This cable has the correct connector for the PC and three plugs for the cassette recorder. It retails for \$5.95. There is a plug for input, a plug for output, and a smaller plug for motor control. You can get by without using motor control, but you will have to start and stop the

***IBM DOES NOT
sell a cassette recorder
or even a cable that will
interface to one.***

machine manually and not from the keyboard.

Larger tape decks can also be used, but the cable will probably need different adapters to handle bigger plugs.

One useful feature is a tape counter to keep track of where your programs and data are stored on a cassette. Any tape can be used, but leaderless tapes (also available from Radio Shack) are a convenience. If you try to record over the leader of a tape, your PC will not know the difference. You will, though, when you find you cannot retrieve the data. Be sure to depress the Record and Play buttons when you save data and programs on tape, just as you would in making an audio recording.

I have found the PC works best with as strong a signal as possible from the tape—always record with the volume on high.

If you want to write-protect a cassette, you can remove the two small tabs on the back (away from the opening) of the cartridge. If you change your mind later, you can cover the openings with a piece of tape and record again with the same cassette.

To test your cassette recorder, you can use the tape version of IBM's diagnostics, available with the PC's Guide to Operations.

Several Readers

A Cheap Stand

Purchase 12 inches of ¾-inch diameter wooden dowling and four rubber

feet to fit the dowling. Cut the dowling into four equal pieces and attach a rubber foot to each. The other end of the dowling pieces will then fit nicely into the recessed screw holes at the underside corners of the IBM Personal Computer Printer.

Additional height can be gained by increasing the length of the legs. If you take advantage of this, be careful you do not give up too much stability.

Richard O. Kilmer
San Antonio, Texas

Sounds like a platform we could run on. Those legs should work on the Epson and other similar lightweight printers, too, I imagine.

A Visible Reminder

I have discovered a very simple technique to use with VisiCalc that has saved me considerable confusion. My discovery was inspired by losing several hours of work on a large worksheet when I accidentally wrote over an existing worksheet with a new one. The accident happened because I had forgotten the name of the worksheet I was working on.

Now I have a way to prevent this. At the top of every worksheet in location A1, I place the name of the worksheet itself. In location B1, I write the date of the last update.

When I'm ready to save a worksheet after updating it, I first move the cursor to

***L*ISTING
numbers change
automatically to keep
track of modules and
subroutines.**

the top left corner of the screen by pressing the Home key. I then enter /SS. At this stage I can scroll through the names of the files on the disk by repeatedly pressing the --> key combination. I continue scrolling through the file names until one appears in the VisiCalc edit line that matches the name I stored at location A1. Since both names are visible on the screen, there is only a small chance of writing over the

wrong worksheet by mistake. When the names match, I press the Enter key to save the updated version.

This convention is also useful when I need a printout of a worksheet. When the worksheet is printed, the first thing I see is

SINCE BOTH names are visible there is only a small chance of writing over the wrong worksheet.

its name and date of creation, a handy reminder. Of course, I can eliminate this information before it appears in the final version of a report by using the VisiCalc printing controls.

Phil Mader
Wichita, Kansas

Perfect Recall

The following is a short program I wrote to save any pattern or display to disk for later recall:

```
10 REM Scrnsave screen dump
20 DEF SEG=&HB800:Input A$
30 BSAVE A$,0,&H4000
```

And then this program will retrieve it from disk at a later time:

```
10 REM Before running, enter screen
11 REM status, as in Screen 1.0
12 REM Enter colors, as in Color 13,1
```

```
20 Input "Filename:",a$:CLS
30 DEF SEG=&HB800:BLOAD A$
```

Both these programs can be incorporated into others as routines for dumping and retrieving screens.

Mike Slessor

Whonnock, British Columbia, Canada

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A perennial from IBM keeps on blooming, a quick look at EEPROMS, and a comment on burgeoning interest abroad in computer education.

The View From Here (And From Tasmania)

IBM has been much in the news lately, which should not be surprising for the largest computer manufacturer in the world. However, some of the news items are eyebrow raisers.

Typewriters Not Dead Yet

As a reader of PC, you "know" that the world is beating a path to the PC (and other personal computers). Even companies that cannot justify the purchase of a PC are switching to electronic typewriters if we can believe the ads of Xerox, Brother, and Olympia. Well, their claims just may not be true.

A recent article in *The Wall Street Journal* pointed out that the 22-year-old IBM Selectric typewriter had an enormously successful sales year in 1982, with roughly 450,000 units sold compared to sales of around 260,000 units of all electronic typewriters combined.

As the article noted, "That flies in the face of optimistic forecasts made for the computerized electronic typewriters ever since their debut in 1978. The intelligent typewriters promised to become crucial to the 'office of the future' by making secretarial typing chores easier, faster, and cheaper."

Although the switch to electronic machines is accelerating, with eight million

Selectrics in use, IBM gives every sign that it expects to sell millions more of its electric machine.

Hence, it is apparent that the PC is not replacing existing office equipment, but is finding its way onto desks that have never

THE EEPROM
can be erased and
reprogrammed up to
10,000 times with just a
small burst of
electricity.

held a typewriter before—and finding its way in huge numbers! What is IBM's reaction to all of this? Tight-lipped, of course, but we can glean some intelligence by observing closely what is happening among IBM suppliers.

New High End IBM PC?

Although, the much-rumored low-end PC, dubbed the "Peanut," appears likely to make a debut before the end of the year,

suppliers see some interesting activity at the high end (of the personal computer spectrum).

IBM is expected to introduce an upgraded version of the PC built around an 8086 or 186 mpu, both of which have a true 16-bit interface. It is also expected that IBM will include as much as 256K of memory in the basic machine. As a result, many add-on makers are shifting emphasis to high-capacity storage products and to multi-function boards compatible with the new 16-bit mpu and associated revision of MS-DOS.

Davong, for example, has a combination add-on board for the IBM PC that will include networking capabilities, a real-time clock, RS-232 ports and a parallel port. AST has a similar board in the works as well as 16-bit versions of its current 8-bit offerings. Quces is also redesigning its current Big Blue, which offers a Z80 CP/M card; calendar clock; 64K RAM; and serial, parallel, and hard disk interfaces.

In the area of mass storage, Arnold Geller of Quces says the company will be emphasizing hard disk subsystems of 20 megabytes and up. Vista and TecMar also expect to put increased emphasis on high capacity memory devices.

More immediately, Martin Alpert, president of TecMar says his firm will

soon introduce a backup drive for the fixed disk drive that IBM unveiled in March.

ROMs, PROMs, and EEPROMs

While on the subject of memory, here's a news note about a new type of memory that probably won't be in the next version of the PC, but that you might meet in your next trip to the supermarket. It's called an EEPROM. First, a bit of history. Nonvolatile memory chips have programs and data permanently stored in the chip and are called read only memories (ROM) because they can only be read and not altered. Producing a ROM chip is a costly operation since a mask must be made and the chip manufactured in quantity to justify the development cost.

Several years later, chip makers found a way to make a blank ROM chip that could be programmed the first time it was put into an active circuit. This was called, appropriately enough, a PROM, or programmable ROM. Once programmed, it could not be erased or reused.

The next advance was an EPROM, or Erasable PROM. This chip cannot be erased in normal use, but it can be removed from the circuit and exposed to ultraviolet light for about 15 minutes to

programmed from information transmitted by telephone or even radio. It is ideal for changing prices and codes in electronic scanning cash registers. The military already uses EEPROMs in air-to-air missiles to distinguish friendly from enemy aircraft. Older chips had to be replaced as new aircraft that were not in the memory went into service; the new chip can be quickly reprogrammed to deal with new planes.

And Elsewhere

A recent article in the *London Times* noted that Britain is the first country to have provided almost every secondary school in the country with a microcomputer. During the past 18 months, over 5,800 schools took advantage of the government's "Micros in Schools" program. According to Kenneth Baker, Industry Minister of State, "Every secondary school now has some computer facility and we are the first country in the world to achieve this."

The Far East is notable for producing great numbers of electronic products at low cost, but outside of Japan, computer literacy is not widespread. On a recent trip to Singapore, however, I noted that the Singaporeans, at least, are trying to change that.

While walking around Jurong, an industrial manufacturing center, I saw huge banners everywhere urging workers to become computer literate. Free courses were offered at the Workers' Center, a kind of union.

My trip also took me to Tasmania, the southernmost state of Australia. There too, computer literacy was a widespread imperative. This is despite an economy based primarily on timber, fishing, and a gambling casino in the capital city of Hobart.

For years, I have been an outspoken advocate of computer literacy at all levels of the population. Given the worldwide movement in that direction, it is disturbing to note that here at home the biggest opponents of the congressional bill that would allow computer manufacturers to donate machines to schools, was the National Education Association. Its gripe was that it would make more work for teachers. With an attitude like that, it's no wonder that we're losing our technological lead to other nations. —David Ahl

I SAW
huge banners
everywhere urging
workers to become
computer literate.

blank out the contents. It is then ready for reprogramming.

Now, Intel has announced an EEPROM, which means Electrically Erasable Programmable Read Only Memory. The EEPROM can be erased and reprogrammed up to 10,000 times with just a small burst of electricity. According to Don Knowlton, an Intel product manager, "The EEPROM is ideal for prices and look-up tables that have to be updated frequently."

Moreover, an EEPROM can be repro-

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UNLEASH THE GRAPHICS POTENTIAL OF YOUR PC

Have you marveled at the colors and shapes that programmers manage to conjure on the screen of your PC? "Too complicated," you may have said. "There's no way to do that in BASIC," you may have argued.

This is simply not true. To illustrate the point, PC presents a three-part serialization of an important new book by Mitchell Waite and Christopher L. Morgan. The IBM PC Graphics Primer, will not otherwise be available until publication by Osborne/McGraw Hill later this year. This is a bit more than a primer; it will introduce you to some advanced graphics concepts and applications, as well as fundamentals.

In this first excerpt, Waite and Morgan lead a guided tour through the PC's color/graphics and monochrome adapters, the medium and high-resolution color modes and provide an introduction to the plotting and drawing commands of Advanced BASIC.

The IBM PC, with its extremely high resolution screen and friendly, forgiving software, represents an entirely new breed of drawing machine. It can independently control a total of 128,000 pixels, twice the resolution of earlier machines such as the Apple II and the Atari, making it more than adequate for business, and especially useful for engineering and scientific graphics. Compared to the six colors of the Apple II, the IBM excels in its color complement, allowing 16 different colors on the screen at one time. Further, to ease the programmer's

efforts, the PC has a powerful yet easy-to-use graphics language. For the three-piece suit, asphalt jungle business world, the IBM PC excels in producing forms, pie

Copyright © 1983 Christopher L. Morgan and The Waite Group, Inc. All rights reserved. Portions of this series will be included in the upcoming book IBM PC Graphics Primer by Mitchell Waite and Christopher L. Morgan, to be published in 1983 by Osborne/McGraw-Hill. Reproduced with permission of the copyright owners.

charts, bar-graphs, and similar kinds of business graphics with few keystrokes. It is also possible to produce sophisticated Computer Aided Design (CAD),—detailed schematics, floor plans, engineering drawings, etc.—realistically on the screen.

“Computer graphics” conjures up images of two quite diverse fields. Indeed, the word *graphics* has been designated for the production of synthetic (designed and artificially produced) pictures for such fields as entertainment, advertising, business, medicine, education, scientific research, and engineering. The resulting pictures are also called *graphics*, and when good quality *graphics* are required, people called *graphic artists* are often called in. Using a specialist for every such picture is both expensive and time consuming. A cost-effective alternative is to employ a computer, the other part of the name.

Now, if you were to design an ideal machine to generate *graphics* for such fields automatically, you would soon come to the realization that you were designing a general purpose computer system with, of course, some extra bells and whistles, such as a color TV monitor and a color printer. As a result, we see that “computer *graphics*” quite adequately de-

COMPUTER-generated pictures have a high degree of contrast from one point to another.

scribes the automated production of synthetic pictures.

Automating *graphics* does not dehumanize it, nor does it make the production of *graphics* trivial. The computer can really act only as a powerful tool that extends our abilities, rather than cutting them off. With a computer helping, we are able to specify pictures of our own choosing, letting the computer execute these specifications at our will. The computer will repeatedly, without tiring or complaining, execute draft after draft of the picture. We can explore different placements, differ-

ent perspectives, different colors, and the like until we are satisfied with the results.

A number of people are directly involved in fields that require *graphics*, and nearly everyone is affected by the results. As computer *graphics* continues its phenomenal growth, more and more people will be affected, many in ways that they never dreamed of. The advent of the inexpensive personal computer, as we will soon discuss, is making most of this growth possible.

Although knowledge of the BASIC programming language is helpful when using the book, it is not necessary to learn from the examples. The *graphics* examples are short enough to be typed into your own PC and run on the spot.

Hardware and Software

Let's look at the IBM PC in terms of what you need to use this book effectively. We will discuss the particular configuration of the IBM PC that was used to develop our examples, and we will explain alternatives and variations of this.

This book is almost entirely centered upon the “softcopy” video displays as opposed to pictures produced with plotters and other hardcopy devices. The color *graphics* adapter and the monochrome adapter both consist of printed circuit boards that you plug into the IBM PC and connect to a video monitor, and both can be used to produce the main output for the machine for listing programs, displaying output data and the like. However, the monochrome adapter requires a special nonstandard display monitor called the monochrome display unit, while the color adapter can be connected to a variety of video monitors and televisions. As the names imply, the color *graphics* adapter produces a multicolor TV signal, and the monochrome adapter produces a single-color signal. We will explore other similarities and differences between these two adapters throughout the rest of this book.

It is quite possible to run the machine with either adapter or both adapters. You just plug the adapters into slots on the main circuit board, and set certain switches to let your machine know what it is carrying. These switches are inside the chassis, but you will have to open the chassis anyway to plug the adapter board into its slot. There is even a switch setting

described in the IBM manual for the case of no adapters, but it is hard to see how this particular “combination” would be useful, for what good is a general purpose computer without any main output?

If you only have the color adapter and you set the switches properly, then your

IF YOU ADD white to a pure color, it will appear less saturated.

machine will come up showing its output on your color monitor (which, of course, you have connected to the color adapter). If you only have the monochrome adapter or if you have both adapters, the machine will come up with output going to your monochrome display unit. (Again, this is connected to the monochrome adapter.)

If you have both adapters installed, then you will need some “secret” codes to switch back and forth between the two. IBM supplies a special User Update that gives two BASIC programs for this purpose. When you turn on a machine that has this configuration, it is considered good practice to initialize both units. That is, you should immediately switch over to the color *graphics* adapter. If you plan to work with the monochrome, you can switch right back. The reason it is a good idea to initialize both devices is that they both contain various circuits that are designed to oscillate at certain predictable frequencies, and if not initialized these will oscillate wildly, perhaps generating a little extra heat that could build up and hurt some of the components on the adapters.

As you may have already surmised, to use this book you will need to have the color *graphics* adapter, but not necessarily the monochrome adapter.

Although the basic IBM PC model does not include disk drives, we will assume that your machine does have them. Either the single-density or double-density drives will do. We need the drives to support the IBM Advanced BASIC. This BASIC costs a bit extra, but is well worth the price because of its extra features, such

as CIRCLE, PUT, GET, PAINT, and DRAW. You will definitely need Advanced BASIC to enjoy and make proper use of this book.

Every example in this book was developed with the standard 64K of memory, so you will not need to purchase any extra memory to get the examples to work. There is no harm in having more memory, but it offers no help as far as this book is concerned.

The Two Video Adapters

Now let's look more closely at the two video adapters. We start with the monochrome adapter.

The monochrome adapter is a board that is installed inside the main computer enclosure, and is meant to work in conjunction with the monochrome display, a special 12-inch TV monitor that has a green phosphor CRT, giving a green color to the letters. The reason for the green phosphor is to reduce flicker, an annoying effect caused by visible oscillation of the intensity level of the image. It turns out that the monochrome adapter produces a video signal with a slower scan rate than that of the standard TV. The IBM monochrome adapter scans at 50 times per second through the picture, while the American TV standard is 60 times per second. At the slower frequency, an image displayed using regular white phosphors fades noticeably between scans. Consequently, the image will appear to flicker. The green phosphor retains light longer than a white phosphor and thus compensates for the slower scan rate.

Besides the scan rate, there are other differences that make the IBM Monochrome system incompatible with standard TV monitors. These include the fact that the horizontal and vertical synchronization signals are carried over separate wires instead of being combined with the main video signal.

The monochrome system produces a textual display of 80 characters horizontally and 25 characters vertically. It has only one mode, as opposed to the versatile color graphics adapter, which has four fully supported modes plus at least one more that is as yet unsupported. It should be noted that in its one text mode, the monochrome display produces an excellent quality image. Each character is formed within a dot matrix that is 9 dots wide by 14 dots high. This is much more

detail than possible with the color graphics adapter with its 8-by-8 dot matrix. Because of this, the monochrome adapter, can be used with word processing and extensive data entry applications.

The color graphics adapter, in contrast to the monochrome adapter, does produce a standard video signal. This can be hooked up to a TV or monitor in three different ways. First, you can drive an ordinary TV through an RF NTSC modulator that you can buy. This provides the poorest image. Second, you can use an output from an RCA-type phono plug to drive the video input of an NTSC color video monitor directly. This gives a better image. Third, you can connect an output from a 9-pin D shell connector to a special TTL RGB color monitor. This gives the best image. Be warned, however: better resolution costs more.

The color graphics adapter has two supported text modes and two supported graphics modes. It is possible to print text in all four modes, although the machine carries this out by different methods. Of the text modes, there is a lower resolution and a higher resolution mode, and the same is true for the graphics mode. The lower resolution modes for text and graphics both have 40 characters horizontally, and the high resolution modes for text and graphics both have 80 characters across the screen. The number of characters horizontally across the screen is related to the horizontal size of the characters and is a good measure of the resolution of the par-

OVERSCAN
*is acceptable and
perhaps desirable for
ordinary TV pictures,
but not for most
computer-generated
displays.*

ticular mode. (see Figure 1).

The low resolution modes (text and graphics) are designed for use with a color TV with the RF modulator or NTSC color monitor. In both cases, the electronics are just not good enough to support much

more resolution, but by restricting the display to 40 characters across, we get a very readable display. Almost all our examples (except those that best illustrate the high resolution modes) are kept to this shorter line length.

Both text modes allow you to color each character on the display separately. In fact, the foreground of each character can be given one of 16 different colors and the background one of 8 colors. In addition, the characters can be individually put into blinking or nonblinking mode. The secret lies in the fact that each character position is assigned a special 8-bit number to control color and blinking attributes.

The low resolution graphics mode (usually called the medium resolution graphics mode) is the prevailing mode in this book. Although we call the resolution "low" or "medium," it is quite respectable, with 320 dots (pixels) horizontally and 200 dots vertically, giving a total of 64,000 individually controllable dots on the screen. Each dot on the screen can be assigned one of four different colors. For this reason we sometimes refer to this mode as the "colorful" mode.

The high resolution modes produce a display that is quite readable if a black and white TV monitor is used instead of a color monitor. The NTSC output (either through the RF modulator or direct video) for both the text and the graphics high resolution modes are black and white signals.

The high resolution graphics mode has a pleasing horizontal resolution of 640 dots and a respectable vertical resolution of 200 dots. That's 640-by-200, or 128,000 dots. Alas, there are only two "colors" for each dot: black or bright. This is all that can be done with a total of 16K RAM devoted to the screen.

For all four modes, there are 25 characters vertically. Given this same vertical packing, it is interesting to see how much the horizontal squeezing and unsqueezing of characters dominates the readability of the characters.

Color Video and Its Limitations

What makes color video tick and in particular why can't you get more resolution out of a color TV than the IBM does? You must remember that black and white TV came first. Color was added later. Because of this, there had to be special

considerations to make sure that the black and white televisions would still work the same.

Let's start by looking at how the picture is produced on a TV or video monitor. For standard broadcast TV, an electron beam constantly sweeps across the face of the picture tube in what is called the raster scan pattern (see Figure 2). With this pattern, the beam begins at the upper left corner of the tube toward the right. During this left-to-right motion it makes one scan line of the picture by shooting out electrons that light up the phosphor on the face of the tube. As soon as the beam reaches the right side of the tube, it reverses its direction and travels back to the left side of the picture tube. During this right-to-left return trip, it does not shoot out any electrons (well, hardly any) and it travels at a much faster rate of speed. This is called "horizontal retrace." Now, as the beam sweeps back and forth, it gradually moves downward. Thus each scan line it produces is slightly lower than the previous scan line. It puts out more than 200 scan lines in this manner before it reaches the bottom of the picture tube. When it reaches bottom, it quickly moves to the top to begin the whole trip again. This quick bottom-to-top return trip is called "vertical retrace."

On the standard TV, every second trip through the raster is slightly different from the first in that it produces scan lines in-between those of the first trip, thus achieving what is called an "interlaced" pattern. Each trip through the raster is called a "field." With an interlaced display, two fields form a "frame" to make a complete picture. Normal broadcast TV presents two slightly different pictures for the two interlaced fields that form a complete picture. This gives you twice the resolution possible using just one frame. However,

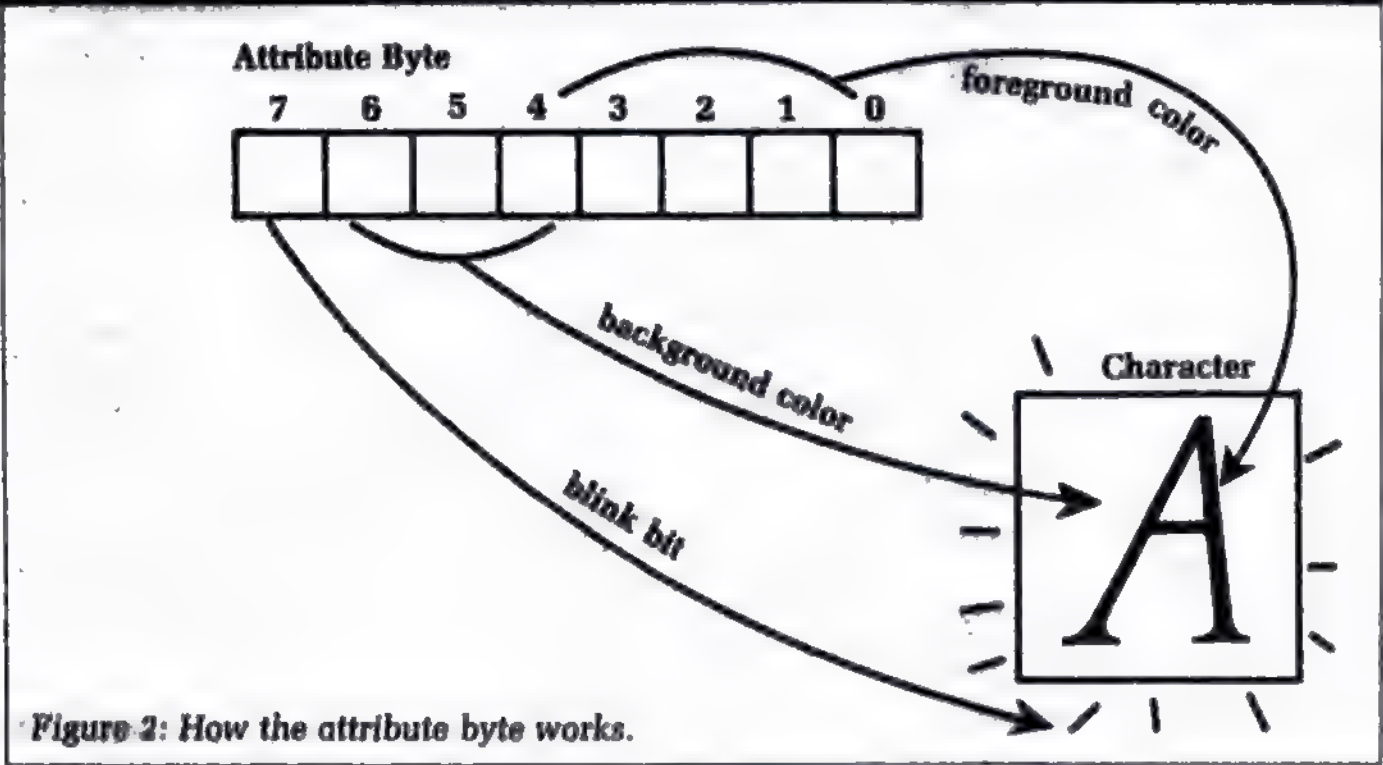


Figure 2: How the attribute byte works.

most computer-generated output does not take advantage of this extra resolution, but gives essentially the same picture for these two different fields.

There is a good reason for this difference between standard TV and computer-generated pictures. It has to do with the fact that computer-generated pictures

THE FORE-ground of each character can be given one of 16 different colors and the background one of 8 colors.

have a high degree of contrast from one point to another, whereas ordinary broadcast pictures usually blend smoothly from one point to another. On normal interlaced display, the fields of a picture are drawn at a rate of about 60 per second, but

since it takes two fields to make a complete picture, any particular dot on the screen is redrawn only 30 times a second. If the dot is brightly lit and its neighbors are not, it will most likely flicker. If a pixel contains a pair of dots, one in each field, then it will be refreshed twice as often and thus have considerably less flicker. In other words, since there is so much contrast in a computer-generated picture, interlace would cause flickering. Hence, contrast is not normally used to gain increased vertical resolution.

It should be noted that most TVs overscan the picture. That is, the scan lines extend both to the left and to the right of the visible part of the picture tube. Thus you never see all of what is being sent to the TV receiver. Overscan is acceptable and perhaps desirable for ordinary TV pictures, but not for most computer-generated displays. Overscan is desirable for broadcast TV because as the components in a TV age, the picture may tend to shrink. If the picture was not originally larger than the screen, the picture might shrink enough to cause distracting borders to appear.)

Now let's look at the broadcast video signals that drive such displays. We start with black and white broadcast TV. The black and white TV signal consists of several components: the horizontal synchronization signal, the vertical synchronization signal, and the basic signal that carries information on the proper intensity for the beam as it scans the dots on the screen. The TV receiver uses the synchronization signals to set up its raster scan pattern on the face of the picture tube. The horizontal and vertical synchronization signals separately coordinate the horizon-

Figure 1: Supported modes of the Color/Graphics Adapter.

Mode	Text/ Graphics	Horizontal Resolution	Vertical Resolution	Characters per Row	Number of Rows of Characters	Number of Pixels	Color
low resolution text	text	40	25	40	25	—	16 foreground 8 background 16 border
high resolution text	text	80	25	80	25	—	16 foreground 8 background 16 border
medium resolution text	graphics	320	200	40	25	64,000	3 foreground 16 background
high resolution text	graphics	640	200	80	25	128,000	black and white

tal and vertical motion on the beam to achieve the proper pattern. The intensity signal is also carefully coordinated with the synchronization signals to make the dots appear in precisely the right location.

There is a standard called RS-170 for combining these synchronization and intensity signals into one signal for black and white TV. With this standard there are exactly 525 lines displayed on the screen in an interlaced pattern. Because of the vertical retrace, only about 480 of these are available for display. This is the effective limit on the vertical resolution of the picture, although because of the flicker, you normally have to settle for half of this,

or 240 lines.

To add color, we need another signal called the "chrominance." This signal actually carries two kinds of color information: hue and saturation. Hue refers to what we ordinarily call color (blue, red, green, etc.). Saturation is the degree of colorfulness; that is, the brilliance of the color. If you add white to a pure color, it will appear less saturated. Most color TVs have a hue control knob to adjust the hue, and a color control knob to which adjusts the saturation. If you turn the color control all the way down, you get a black and white picture, and if you turn it all the way up, the picture appears garish. The chrominance signal is assigned a special frequency

of 3,579 million cycles per second within the total TV signal channel. This is called the color "subcarrier" frequency. Incidentally, fractional multiples of this frequency are used within the IBM PC to synchronize the clocks that control its CPU and memory activity.

Before the beginning of each line on the screen, there is a special alignment time period in which the color subcarrier is produced. This is called the "color burst." The color of the dots on the following line are determined by comparing the chrominance signal against the standard frequency set up by this color burst. A phase shift (a slipping ahead or behind) causes a change in hue; a change in amplitude causes a change in saturation. Because the phase shift is so hard to control, the hue varies widely from one display to another and needs to be carefully adjusted.

The standard for sending color video signals in the United States is called the NTSC standard; NTSC stands for "National Television Standards Committee." Because of the difficulties in getting the hue just right, some people refer to NTSC as "Never Twice the Same Color."

Now let's look at a definite limitation of the NTSC standard when it is used to send pictures generated by a computer. This has to do with the frequency of the subcarrier. Changes in color cannot be effectively made faster than the frequency of this subcarrier. This is a real limitation, for a careful computation will show that there are exactly 227.5 cycles of the color subcarrier for each line of the display. Thus the horizontal color resolution cannot be greater than this number. However, only some of these cycles are available in the display itself because some of these cycles occur during time that the beam is not active, such as when it is "retracing" (moving back from the right side of the screen to the left in preparation for the next line).

With the IBM PC, there are exactly 160 cycles of this color subcarrier that occur while the beam is actively scanning a line. Since information cannot be changed any faster than its carrier frequency, we are limited to 160 valid color changes per line of the screen. We say that we have 160 "color clocks" per line. The horizontal resolution in the medium resolution color graphics mode is twice that, namely 320. Thus we have a dot resolution that is twice the color resolution.

Figure 3: How graphics command works.

```

100 REM MANDALA
110 REM
120 REM This program draws a mandala
130 REM and then prints the title
140 REM "IBM PC" in the center with
150 REM large letters.
160 REM
170 SCREEN 2 REM high res graphics
180 KEY OFF
190 CLS
200 REM
210 FOR I = 0 TO 20
220 X1 = 32*I
230 X2 = 640 - 32*I
240 Y1 = 10*I
250 Y2 = 200 - 10*I
260 LINE (X1,0)-(640,Y1)
270 LINE (X1,200)-(640,Y2)
280 LINE (X2,0)-(0,Y1)
290 LINE (X2,200)-(0,Y2)
300 NEXT I
310 REM
320 REM border of points
330 FOR X = 160 TO 480 STEP 8
340 PSET (X,70)
350 PSET (X,130)
360 NEXT X
370 REM
380 FOR Y = 70 TO 130 STEP 4
390 PSET (160,Y)
400 PSET (480,Y)
410 NEXT Y
420 REM the letter I
430 LINE (200,80)-(210,120)
440 LINE (192,80)-(208,80)
450 LINE (192,120)-(208,120)
460 REM
470 REM the letter B
480 PSET (248,100)
490 LINE -(256,104)
500 LINE -(256,116)
510 LINE -(248,120)
520 LINE -(224,120)
530 LINE -(224,80)
540 LINE -(248,80)
550 LINE -(256,84)
560 LINE -(256,96)
570 LINE -(248,100)
580 LINE -(224,100)
590 REM
600 REM the letter M
610 PSET (280,120)
620 LINE -(280,80)
630 LINE -(296,88)
640 LINE -(304,88)
650 LINE -(320,80)
660 LINE -(320,120)
670 REM
680 REM the letter P
690 PSET (360,120)
700 LINE -(360,80)
710 LINE -(384,80)
720 LINE -(392,84)
730 LINE -(392,96)
740 LINE -(384,100)
750 LINE -(360,100)
760 REM
770 REM the letter C
780 PSET (448,116)
790 LINE -(440,120)
800 LINE -(424,120)
810 LINE -(416,116)
820 LINE -(416,84)
830 LINE -(424,80)
840 LINE -(440,80)
850 LINE -(448,84)

```


Software Breakthrough...

NEW QUIKPRO + PLUS WRITES PROGRAMS FOR YOU IN MINUTES ON YOUR Micro

Technical Review
by Wayne Hepburn

QUIKPRO + PLUS is a new breakthrough in software for microcomputers from ICR-FutureSoft.

Until now, whenever you wanted a new separate program in BASIC (Microsoft Basic/MBasic/Basic 80/Oasis Basic), you had to spend a lot of dollars for it, or a lot of hours creating it (if you have the know-how). That's all in the past now.

Anybody who can turn on a computer can write a program, quickly, with this new **Quikpro + Plus** software which generates programs for you. **Quikpro + Plus** is the invention of Joseph Tamargo of Florida. His brilliant approach to program writing allows you to tap the real power and speed of your microcomputer, and it is about time this happened.

I interviewed him to find out more about **Quikpro + Plus** and pass this valuable information to you. He told me "The best part of this software is that it gives you a separate custom program every time you use it. The resulting program is produced, error-free, in BASIC (Microsoft Basic/MBasic/Basic 80/Oasis Basic, as appropriate to your system) for you by **Quikpro + Plus**. What's more, you can list your new program, look at it, see what makes it tick, and modify it as you wish."

You can also, customize, enhance, alter, and even copy the programs you create with **Quikpro + Plus**. This is because programs created by **Quikpro + Plus** are structured, easy to follow, and include many REMARKS statements right in the program listing. I don't know of any other software with the flexibility and ease of use I found in **Quikpro + Plus**.

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For Education, Business, Hobby, Home, Science, Personal, etc. a partial list includes programs like these: Financial Forecasting, Expense Planning, Data Access and Retrieval, Modeling, Record Keeping of all kinds, Statistical Data Banks, and much, much more. **Quikpro + Plus** cuts the time it takes to generate a new custom program down to a few minutes. That's true. I saw a

letter from a user who created a separate program in Basic within fifteen minutes after reading the clear, simple, complete Documentation & Operating Manual for **Quikpro + Plus**. The software will generate File Handling and Data Entry Programs in a file format, drawn right on the screen by user. Programs created by **Quikpro + Plus** produce standard ASCII Data Files allowing data to be easily accessed by other programs, other micro's, and even main frames.

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This software is ready to ship immediately

and you can start writing programs the day you get in. In fact, ICR-FutureSoft guarantees your satisfaction or you can return it for a full refund in ten days after delivery. How's that for confidence? Mr. Tamargo said "There isn't any risk to us...our product works like it's supposed to work and users are very well satisfied. We are glad to guarantee satisfaction."

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decimal code	binary code	color/effect
0	000	black
1	0001	blue
2	0010	green
3	0011	cyan (greenish blue)
4	0100	red
5	0101	magenta (purplish)
6	0110	brown
7	0111	white
8	1000	gray
9	1001	light blue
10	1010	light green
11	1011	light cyan
12	1100	light red
13	1101	light magenta
14	1110	yellow
15	1111	bright white

Figure 4: Binary and decimal codes for PC colors.

Figure 5: Encoding for secondary colors.

decimal	binary	color
3	0011	cyan = green + blue
5	0101	magenta = red + blue
6	0110	brown = red + green
7	0111	white = red + green + blue
9	1001	light blue = gray + blue
10	1010	light green = gray + green
11	1011	light cyan = gray + green + blue
12	1100	light red = gray + red
13	1101	light magenta = gray + red + blue
14	1110	yellow = gray + red + green
15	1111	high intensity white = gray + red + green + blue

BASICA for Graphics

As we have noted earlier, all the examples and detailed discussions use the IBM Advanced BASIC (or BASICA as it's called in the directory).

Once you have graphics hardware such as the IBM color graphics adapter, you need to have a way to make the hardware perform. The first task is to make it plot points. You could write a BASIC subroutine to do this, but this would have several disadvantages: The performance would be poor; a lot of extra code would be needed; extra variables would be used; and your main program would be a lot less readable. Fortunately, Microsoft has incorporated the point plotting commands PSET and PRESET in BASICA. Thus these commands are encoded in machine language for increased efficiency. Further, they are really easy to use; just write the type in one line of code with some numbers and the point will appear on the screen whenever that line is executed. Once you can plot points, you need to draw lines. This is surprisingly difficult to do from scratch if you want any reasonable speed. Again, this is built into BASICA by Microsoft.

Next you want to be able to plot characters. Fortunately, the print statement works in all modes, so you can label your drawings. Thus BASICA has the most essential graphics commands already built into its command structure.

Using only points and lines and text, you can draw just about any picture, at least in wire frame or outline form. To fill in areas of color it would be very helpful to have a paint command. Again, this has been supplied by Microsoft. In fact, as we shall see as we explore the pages of this book, Microsoft has added a complete set of graphics commands that allow you to generate extensive useful graphic activity in response to a few simple commands. Thus, BASICA has a powerful set of built-in graphics commands: Screen, Width, Clr, Color, Pset, Preset, Line, Circle, Draw, Paint, Get, Put, Locate.

It is important to realize what such power brings you. Very simply, if it is difficult to do something (such as filling an area or drawing a circle), then you will not attempt to do it often. If a particular task is made ten times easier, you will probably attempt it ten times more often, thus

increasing productivity by that much.

A Preview of Commands

Now let's preview some of the most basic graphics commands in the IBM black and white 640-by-200 high resolution graphics mode. We will look at a reasonably short and simple program that will help "bootstrap" your understanding of the outstanding graphics capability of the IBM PC. These programs are presented to let you get into the PC fast, without having to wade through tons of introductory lessons.

We will use the following commands: Screen, Key Off, Cls, Pset, and Line. Let's give a quick explanation of what each does and then look at a simple program that uses them to produce a mandala pattern with a title in large letters in the center.

We start with the Screen command. Its simplest syntax is

SCREEN mode

where mode is an expression whose value is 0, 1, or 2. In this form, this command selects the mode. The two text modes are both designated by 0 (you will have to use the Width command to go between them); the medium resolution graphics mode is indicated by 1; and the high resolution graphics mode is indicated by 2. In our example in this chapter, we will want the high resolution mode (mode 2). Thus, the syntax for this command is:

SCREEN 2

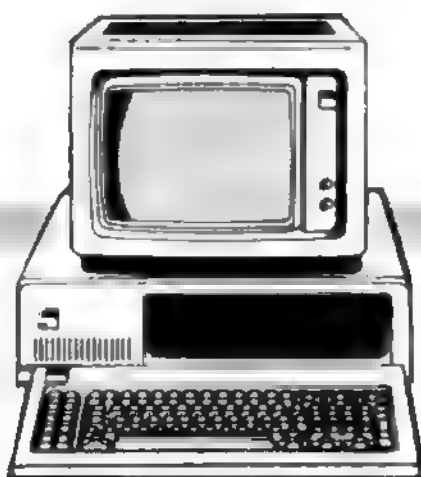
When this command is executed, the screen will configure itself into the high resolution mode.

The Key Off command is used to remove the special function key display at the bottom of the screen. Our pictures will look a lot nicer without this function key display. The syntax for this command is simply:

KEY OFF

There is a command to turn the function key back on. As you might have guessed this is Key On. When the Key Off command is executed, the display immediately disappears.

The next command is Cls. If the Screen command caused us to actually change modes, then the screen is automatically cleared. However, if we were already in high resolution mode and the Screen 2 command is executed to put us in high resolution mode, the screen is not cleared. Thus we would need Cls to clear the



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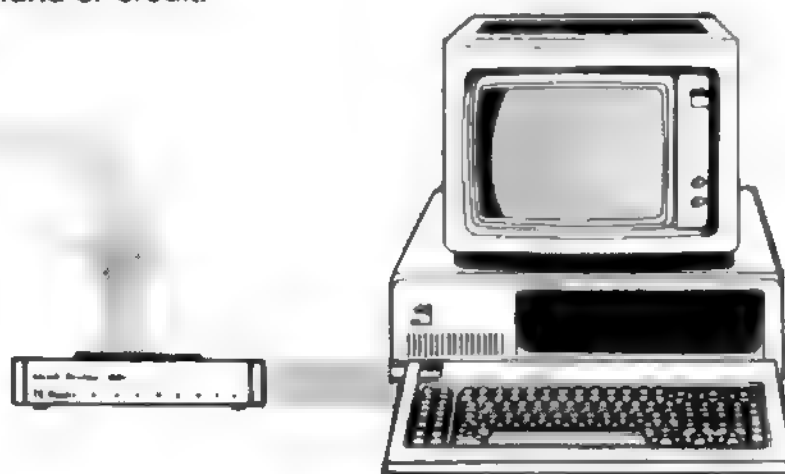
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screen. The syntax is simply:

CLS

When this is executed, the screen will be set to the background color.

Now we get to the command that actually draws things. The Pset command is used to draw points, and the Line command to draw lines (actually line segments). As we will use it in this chapter, the Pset command has the following syntax:

PSET (x,y)

where x and y are BASIC expressions that specify the x and y coordinates of the point that is to be plotted. In the high resolution mode, the possible values for x range from 0 to 639 and the possible values of y range from 0 to 199 with the point (0,0) in the upper left corner of the screen. This gives us access to any point in the 640 horizontal by 200 vertical screen.

We will use two forms of the Line command in this chapter. The first one

LINE (x1,y1)-(x2,y2)

draws a line from the point (x1,y1) to the point (x2,y2). The second form

the smallest sections of the program. The mandala is achieved with the first form of the Line command. We just march the end points of the line around the boundary of the screen. A For loop controls this.

The next section shows what you can do with the Pset command. Here we use it to make a dotted border around a title that will soon appear. Two For loops are needed: one for the horizontal sides of the border and one for the vertical sides.

The last section draws the title. This is the longest section because each stroke of each letter is individually encoded with a separate line command. Notice how the Pset command is used to set the current position before employing a series of Line commands (in the second form) to trace the letter. The current position is like having a hidden graphic cursor, secretly pointing to where you are as you draw. Each command in this section advances this cursor to a new current position. The Pset commands advances it, drawing at the same time.

This section points out what happens when you don't have a certain advanced graphics capability. In this case the IBM PC does not have variable-sized lettering. If it did, the whole section could be done in three easy statements: one to define the size of the lettering, a second to specify the position of the lettering, and a third to specify the string of characters to be printed and initiate the printing. This would be a considerable savings in programming effort and would make the program much more compact.

The Text Modes

As we briefly discussed earlier, there are two text modes: a low resolution text mode with 40 characters horizontally by 25 vertically, and a high resolution text mode with 80 characters horizontally and 25 characters vertically. That is, they both have the same vertical resolution, but one has twice the horizontal resolution of the other. Since text is usually arranged in rows and columns, we will refer to these modes in terms of the maximum number of rows and columns they can hold instead of the total number of horizontal and vertical character positions. Thus we will say that the low resolution text mode has 40 columns and 25 rows, and the high resolution text has 80 columns and 25 rows. Further, we will normally not mention the number of rows since both modes

have the same number. Consequently, we will often refer to the low resolution text mode as the 40-column text mode and the high resolution text mode as the 80-column text mode.

The 40-column low resolution mode is designed for a color display, while the 80-column high resolution mode is designed for a black and white display. However, both modes have the same provisions for individually producing color letters. Later, we will see how to turn the color on and off as we please on both modes, but first let's see how to get into the text modes.

The Screen Command

The Screen command will allow us to select the mode (text in our example). The full syntax for this command is as follows:

```
SCREEN [mode] [,burst] [,apage]
[ ,vpage ]]
```

Square brackets around a quantity indicate that that quantity is optional. Any element within the syntax statement that is omitted should retain its previous value. For this command, we see that all quantities are optional! This is not actually true, for if you type in only the key word SCREEN, the machine will respond with the error message "Missing operand."

Here mode indicates the mapping mode according to the following table:

- 0 = text
- 1 = medium resolution graphics
- 2 = high resolution graphics

We will use mode 0 (text) in our example. Notice that both text modes are assigned

V
VIDEO
*memory is unusual in
that it is constantly
being scanned by the
special video circuitry.*

LINE -(x2,y2)

draws a line from the current position (last point plotted) to the point (x2,y2). In either case, the quantities x1, x2, y1, y2, are expressions in BASIC. The second form is very handy when we want to draw a path consisting of several line segments.

Now let's look at an example that shows how to use these commands to make a design (see Figure 3).

In this example, we use the Screen, Key Off, and Cls commands to make sure that the screen is initialized (in the right mode and erased); then we use a combination of the Pset and Line commands to draw our picture.

The most intricate-appearing part of the picture is a mandala effect around the outside of the screen. However, it turns out that this is very easy to do and is one of

Figure 6: Demonstrating the Poke command

```
100 REM CHARACTER PLOTTER
110 REM
120 SCREEN 0,1
130 WIDTH 40
140 KEY OFF
150 REM
160 CLS
170 REM
180 INPUT "ROW" ; ROW
190 INPUT "COLUMN" ; COLUMN
200 INPUT "ASCII CODE" , ACODE
210 INPUT "FOREGROUND COLOR" ; FCOLOR
220 INPUT "BACKGROUND COLOR" ; BCOLOR
230 INPUT "BLINK" ; BLINK
240 REM
250 FBYTE = 80*(ROW-1)+2*(COLUMN-1)
260 CN = 128*BLINK+16*BCOLOR+FCOLOR
270 REM
280
290 DEF SEG =%H800
300 POKE FBYTE,ACODE
310 POKE FBYTE+1,CN
320
330 A$=INPUT$(1)
340 GOTO 160
```


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this same mode numerical code. This is why we will need the Width command to select which of the two text modes we want.

The next element of the syntax statement, burst, indicates whether or not the color is turned on. Sometimes you may want to turn off the color to improve the readability of the display. A value of 0 specifies black and white only, while a Value of 1 specifies the prescence of color. The color signal, if present, puts out a special alignment burst at the beginning of each horizontal line of the picture. Without this burst, there can be no color.

We will not use the apage or vpage elements in this chapter. For purposes of this chapter, the simplified syntax for the Screen command is:

SCREEN [mode], [,burst]

Refer to the definitions above for an explanation of these two elements in this usage.

Try typing this command with various combinations of syntactical elements. While we are at it, let's discuss another couple of useful commands: Cls and Width.

The WIDTH Command

The Width command allows us to select between the two text modes. The Width command comes in several forms. In general, it can be used to set the line widths for output to floppy disk files or to various other output devices. For us, the output device will be the screen, and we will use it to differentiate between the two text modes with their separate line lengths. It will also switch between the medium and high resolution graphics modes because they have different resolutions and hence different line lengths for any text that they produce.

The full syntax for the form of the Width command that we will use is:

WIDTH width

where width is an expression equal to either 40 or 80. If we are in mode 0 (text), using 40 gets us into the low resolution text mode, and 80 get us into the high resolution text mode. If we are in a graphics mode, 40 gets us into medium resolution and 80 gets us into high resolution. Whenever you change the width, the screen will be cleared, but if you use the Width command to set the width to what is was already, the screen will not be cleared.

In the upcoming examples we will use

40 to ensure that we are in the low resolution text mode, but you can type WIDTH 40 and WIDTH 80 directly to see their effect on the display.

Now that you know how to get into and out of the text modes, let's see what's there.

The Mapping

In either text mode, each character position on the entire screen is assigned two bytes in a special area of main memory. This area is called the video RAM. The chips that contain this memory are actually on the color graphics adapter, and in this sense the color graphics adapter acts like a 16K byte extension to your system's main memory. This video memory starts at the absolute address B800h (735,664 in decimal), a very high address designed to keep it out of the way of ordinary memory. Video memory is unusual in that it is constantly being scanned by the special video circuitry. This circuitry puts out video signals that depend on what is stored in the various

locations of the video memory and the particular mode you are in. We say that this circuitry "maps" the video memory to the video screen.

In the two text modes, the mapping assigns pairs of bytes in the video RAM in a straightforward raster pattern. In this pattern, the first two bytes of video RAM are mapped to the upper left corner of the screen (the first character position), the next two bytes to the next character position—just to the right of the first character position—and so on, across the first row of characters. After that, the next two bytes map to the leftmost character position in the second row, and so on from left to right across that row. The pattern continues row by row to the bottom of the screen. For the low resolution text mode, there are 40-by-25, or 1000, characters. With two bytes per character, this gives 2 by 1000, or 2000 bytes of video memory. For the high resolution text mode we need 2-by-80-by-25, or 4000 bytes of video memory.

For any given character position, we

Figure 7: Code for blink/foreground, background, and border color.

code decimal	binary	foreground	color/effect background	border
0	00000	black	black	black
1	00001	blue	blue	blue
2	00010	green	green	green
3	00011	cyan (greenish blue)	cyan	cyan
4	00100	red	red	red
5	00101	magenta (purplish)	magenta	magenta
6	00110	brown	brown	brown
7	00111	white	white	white
8	01000	gray		gray
9	01001	light blue		light blue
10	01010	light green		light green
11	01011	light cyan		light cyan
12	01100	light red		light red
13	01101	light magenta		light magenta
14	01110	yellow		yellow
15	01111	bright white		bright white
bit 7 on				
16	10000	black		
17	10001	blinking blue		
18	10010	blinking green		
19	10011	blinking cyan (greenish blue)		
20	10100	blinking red		
21	10101	blinking magenta (purplish)		
22	10110	blinking brown		
23	10111	blinking white		
24	11000	blinking gray		
25	11001	blinking light blue		
26	11010	blinking light green		
27	11011	blinking light cyan		
28	11100	blinking light red		
29	11101	blinking light magenta		
30	11110	blinking yellow		
31	11111	blinking bright white		

can use the following formulas to compute the position of the corresponding bytes in the screen memory:

ASCII: First byte = $80 * (\text{row} - 1) + 2 * (\text{column} - 1)$

attributes: Second byte = first byte + 1

For example, the character in the first column, first row, is stored in bytes 0 and 1 of the screen memory, and the character in the second row, first column, is stored in bytes 80 and 81 of the screen memory. For the 80-column mode, just replace the 80 in the first formula by 160.

Here we must use the IBM convention by which rows and columns are numbered beginning with 1 rather than 0. The above formulas give what are called "memory offsets." This is the number of bytes from the beginning of a segment of memory. It is convenient to define the screen memory as such a segment. On the IBM PC, the following BASIC statement will set this segment up for you:

```
DEF SEG = &HB800
```

This tells BASIC that you want to access memory data (perhaps using Peek and Poke) whose segment number is B800 hexadecimal (base 16)). The actual starting address in memory for this segment is 16 times this number, or B800 hexadecimal.

Once the Def Seg is invoked, we can Peek and Poke using the memory offsets in

Figure 8: Coloring scheme commands.

```
100 REM TEXT
110 REM
120 REM
130 REM Displays text characters in
140 REM various colors
150 SCREEN 0,1
160 WIDTH 40
170 CLS
180 REM
190 PRINT TAB (18); "TEXT"
200 REM
210 PRINT:PRINT:PRINT
220 FOR I = 0 TO 7
230 FOR J = 0 TO 31
240 COLOR J, I, 1
250 PRINT "A";
260 NEXT J
270 PRINT
280 NEXT I
290 REM
300 COLOR 15,0,1
```

Figure 9: Palettes for medium resolution graphics.

numerical code	palette #0	palette #1
0	background (1 of 16)	background (1 of 16)
1	green	cyan
2	red	magenta
3	brown (yellow)	white

the above formulas.

Now that we've looked at the mapping in detail, let's examine the encoding and coloring of the characters. The two bytes that map to each character position are used in the following manner. The first byte (at an even address in the video RAM) specifies the extended ASCII code for the character, and the second byte (with an odd address) determines the coloring scheme.

Tables showing the extended ASCII code are contained in the BASIC Manual and the Technical Reference Manual. Each number from 0 to 255 is assigned a certain meaning and a certain symbol. By putting the numbers into the right spots (even-numbered locations) of video memory, we can make the corresponding symbols appear on the screen.

The usual ASCII code only includes the numbers from 0 to 127, but this extended code goes from 0 to 255 (twice as large). The exact form of the symbols is not standardized; nor is the choice of symbols for codes (except for letters, punctuation, and digits) standardized. IBM PC nonstandard symbols include various graphics shapes, all sorts of lines and corners, and some Greek and German letters.

Now let's look at the second byte, the one that determines the coloring scheme. It is often called the "attribute" byte. To see what it does, first understand that each character symbol consists of the character itself (called the foreground) and the rectangular area immediately surrounding it (called the background). The lower four bits (bits 3, 2, 1, and 0) of the attribute byte determine the foreground color of the symbol; bits 6, 5, and 4 determine the background color; and bit 7 determines whether or not the letter blinks. By executing a special command it is possible to make the blink bit (bit number 7) assume partial control of the background color instead (see Figure 2).

The individual bits in this attribute byte actually control individual colors,

which are then mixed together by the video circuitry to make the foreground or background color. It must be understood that TV colors are combined in an additive manner. That is, when colors are combined, they give more light instead of less light. Pigments or filters rely on a subtractive color scheme; when colors are combined, they give less light.

With the additive color system, we can start with red, green, and blue.

decimal	binary	color
1	0001	blue
2	0010	green
4	0100	red
8	1000	gray

Just one bit is "on" (equal to 1) in each of these code numbers. Every other color produced by the color graphics adapter is obtained by adding combinations of these primaries. In general, bit 0 determines whether blue is to be added; bit 1 determines whether green is to be added; and bit 2 determines whether red is to be added. The fourth bit (bit number 3) determines whether additional white (or gray) is to be added. See Figure 4 for a table of all the colors and their codes.

You should find in this table the numbers 1, 2, and 4 corresponding to the binary numbers 0001, 0010, 0100, each of which specifies just one of the "primary" colors: blue, green, or red. In addition, 8 (1000 in binary) is gray.

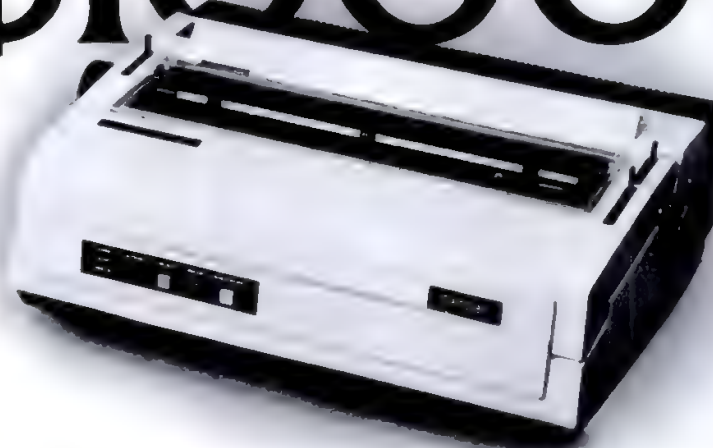
Observe that adding primary colors corresponds to adding their codes. For example, cyan is a mixture of blue and green, and thus has the binary code:

0001 (blue) + 0010 (green) =
0011

which is the decimal number 3. Figure 5 shows the results for all combinations.

Since four bits are allotted to the foreground color, 16 different numbers (0 through 15) can be represented. Thus 16 colors are possible for the letter itself. However, since only three bits are allotted

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to the background color, only eight colors can be represented (0 through 7) in the background of a character in text mode. Thus only the first eight colors are possible for the rectangle surrounding a character in text mode. Because of the way the

AT THE
*slower frequency, an
image displayed using
regular white phosphors
fades noticeably
between scans.*

bits are arranged, the following formula can be used to compute the color code number for a character position

Color code = 128*blink + 16*(background color) + foreground color

The following program demonstrates how all this can be done directly using the Poke command in BASIC (see Figure 6).

Let's look at this program carefully. First the 40-column text mode is invoked, the function keys are turned off, and the screen is cleared. Then you are asked to supply all the necessary information as discussed above. Next the offset of the first byte is computed and stored in the variable FBYTE. The color code is also computed and stored in the variable CN. The screen is cleared. The screen is then defined as a data segment in memory. Finally, both the ASCII code and the color code are Poked into place. You should see the character at this point. The INPUT\$ function in line 330 allows you to pause without destroying anything on the screen. If you press a key, you will continue.

Now let's see how to control the color attributes with the COLOR statement. This is the "official" way to do it.

The Color Command

The Color command allows us to select the foreground and background colors for our letters. For the Color command in the text mode, the syntax is

COLOR [foreground] [, back-

ground] [, border]]

where foreground is an integer expression that indicates the foreground color and the blinking attribute of subsequent characters; background is an expression that indicates the background color of subsequent characters; and border is an expression that indicates the color of the border of the screen.

When the Color command is executed, border sets some bits in the machine that determine the border and the foreground and background are converted into bits of a "model" or "master copy" attribute byte. This master copy is copied into the attribute byte for each subsequent character printed on the screen until the next Color command is executed. Notice that the blink control in this command is combined with the foreground color. When we discussed the actual bits that control these things, we saw that the blink is controlled by bit 7 in the attribute byte and the foreground color is controlled by bits 3 through 0, also in the attribute byte. In this command, these bits are combined to form a five-bit number. See Figure 7 for a table showing the full code for blink/foreground, background, and border color. As the table indicates, any value between 0 and 31 is valid for combined blink/foreground.

Notice that in contrast to the wide selection of foreground colors, there are only eight background colors. This is because there are simply not enough bits available in the attribute byte to provide more (five are already used by the foreground). Background color values lie between 0 and 7. In fact, the table for the background colors consists of the first eight rows of the table in Figure 7.

There are 16 colors possible for the border. These are given by the first 16 rows of the table in Figure 8. The border is that part of the screen that does not correspond to character positions or to graphic dots. As its name implies, it runs around the outside of the screen. One reason computers such as the IBM PC have a border is that they are meant to work with ordinary color TVs, which employ the technique of overscanning.

In the following example, we will make a blue perimeter by selecting the value 1 for border. We will simply put the letter A across the screen in the various color combinations described in the table.

We chose to display many copies of just one letter so that you could clearly see the effects of the coloring scheme (see Figure 8).

In this program, you see how the various commands such as Screen, Width and Cls are being used to set up the mode properly. Then you see a title being printed. After the title, three Print commands skip some lines to separate the title from the display. Next, a double For loop controls the Color and Print statements to make the display. Here we see how the eight rows of 32 columns are made.

If you want to see what characters look like in the 80-column text mode, change the width to 80 in line 160. If you are using an NTSC TV or monitor, you should find the letters very hard to read in this higher resolution. If you turn off the color, by changing line 150 to

150 SCREEN 0,0

the characters should be a lot more readable.

The Graphics Mode

As we saw earlier, there are two fully-supported graphics modes in the IBM PC:

INDIVIDUAL
*colors are mixed
together by the video
circuitry to make the
foreground or
background color.*

a medium resolution mode and a high resolution mode. Like the text modes, the lower resolution mode is designed for color TV or monitors, and the higher resolution is designed for black and white images. This time the high resolution is not even designed to produce any color.

In these graphics modes, each dot that we can control on the screen as a logical unit is called a "pixel." This stands for picture element. We will use this term rather than dots because it is more precise. The problem with the word dot is that there are lots of physical dots (consisting of phosphor) that make up the entire

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screen, and it will often take quite a few physical dots to make up one logical dot or pixel of our picture. Another problem is that pixels, especially in lower resolution modes, often appear rectangular and not "dotlike."

The medium resolution mode has 320 pixels horizontally and 200 pixels vertically with four possible colors for each pixel. Earlier, we saw that the horizontal pixel resolution of this mode is twice that of the color resolution of an ordinary (NTSC) color TV signal. This 320-pixel-across mode allows you to select one of four colors for each point. However, this coloring can only be seen if it is at least two pixels wide.

To illustrate this mode, we will present an example that shows off the colors. It will use some of the same graphics commands as already discussed for the last example. However, in the graphics mode, the Color statement has slightly different syntax. In particular, it is only valid in the medium resolution graphics mode and, in fact, leads to an error message when it is used in the high resolution graphics mode.

The full syntax for the Color command in the medium resolution graphics mode is:

COLOR [background] [,palette]

Here background is any one of the 16 colors as specified in the first 16 rows of the above color table. The background color also controls the color of the border (see Figure 7). The second quantity, palette, gives you a choice between two sets of colors that work with subsequent graphics commands. In the medium resolution graphics mode, each pixel on the screen is assigned a number from 0 to 3. Figure 9 shows how these numerical codes correspond to colors on the screen in these two different palettes.

From this table, you can see that color number 0 is determined by whatever the background color happens to be, but the other numbers each have two possibilities according to the choice of palette.

In the following example, we use a special form of the Line command to draw solid boxes of color. Here is the syntax as we will use it:

LINE (x1,y1)-(x2,y2), color, BF

This command will cause a box to be drawn whose corners are (x1,y1), (x1,y2),

(x2,y1), and (x2,y2). The entire inside and boundary of the box will be given the color "color" (see Figure 10).

Figure 10: How line commands work.

```
100 REM MEDIUM RESOLUTION MODE
110 REM
120 REM In this example we draw four
130 REM boxes, one for each of the four
140 REM available colors. At the end
150 REM we cycle through the various
160 REM background colors and palettes.
170 REM
180 SCREEN 1
190 CLS
200 REM
210 PRINT TAB (12);
220 PRINT "Medium Resolution"
230 REM
240 REM make the boxes
250 LINE ( 40, 40)-(160,100),0,BF
260 LINE (160, 40)-(280,100),1,BF
270 LINE ( 40,100)-(160,160),2,BF
280 LINE (160,100)-(280,160),3,BF
290 REM
300 REM now cycle through the background
310 REM colors and palettes
320 FOR I = 0 TO 15 ' foreground
330 COLOR I,0 ' palette 0
340 FOR J = 1 TO 1000:NEXT J ' wait
350 COLOR I,1 ' palette 1
360 FOR J = 1 TO 1000:NEXT J ' wait
370 NEXT I
380 REM
390 COLOR 0,1
```

Let's look at this example in detail. The Screen command and the Cls make sure that we are in the medium resolution graphics mode with a clear screen. The two Print statements put a title "Medium Resolution" at the top of the screen. Next, the four Line statements place the colored boxes on the screen. Notice that the boxes do not fill up the entire screen. This is because on some TVs, filling the entire screen with strong colors would tear up the image as though you painted the picture on paper and then crumpled the paper.

Notice that the four boxes each have a different value for color. When the boxes are displayed, you will not see one of them, the one that has color code 0. It is not seen because it is the same color as the surrounding background and border. The box with color code 3 is colored with foreground color (white or yellow, depending upon the palette).

The last part of the program cycles

through all possible palettes and background colors. This is done in a For loop whose index I goes through all 16 background colors. Within the For loop we set the palette to 0 (with background color I), then wait for a count of 1000 with an empty For loop indexed by J. Why don't you type this program in, type RUN, and

PIXELS
often appear rectangular
and not "dotlike."

watch the screen go through all these great color combinations?

Now let's take a quick look at the high resolution mode. It is definitely less colorful, but it does have excellent horizontal resolution with 640 pixels per line. This is twice as many pixels per line as the medium resolution graphics mode. The pixels are half as long in the horizontal direction. This allows finer detail and smaller text, which can be an important feature when making labeled diagrams. The vertical resolution, 200 pixels, is the same as the medium resolution graphics mode. Each pixel can only be one of two colors: black (off) or brightly lit (on). A color code of 0 indicates black. This is called the background color for this mode. A color code of 1 indicates brightly lit. This is called the foreground color for this mode. You are allowed to specify color codes 2 and 3, but 2 will be stored as a 0 and 3 will be stored as a 1. That is, the machine can only store the rightmost bit of any numerical color code because there is only one bit per pixel.

The horizontal resolution for the high resolution graphics mode is four times that of the NTSC color system, but since the color is "turned off" in this mode, the resulting weird color effects are not a problem. /PC

In the next excerpt of IBM PC Graphics Primer, authors Mitchell Waite and Christopher L. Morgan will discuss plotting, line drawing, and circle drawing. They will explain such practical applications as pie charts, bar charts, and three-dimensional views.

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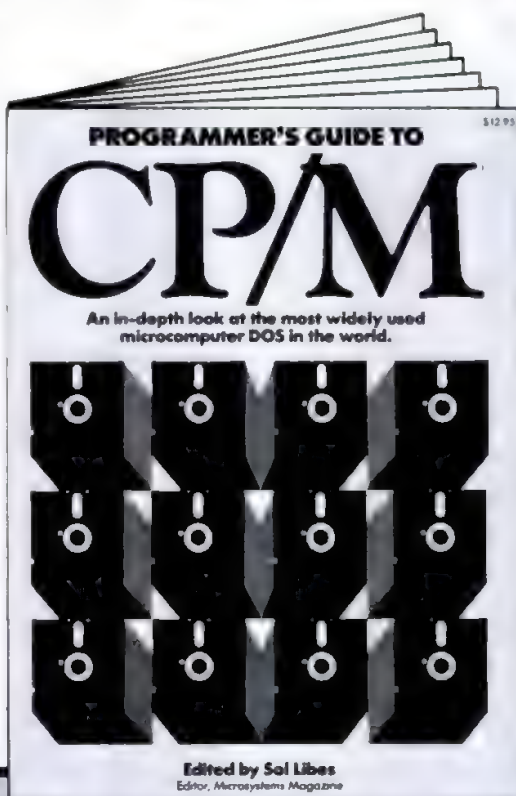
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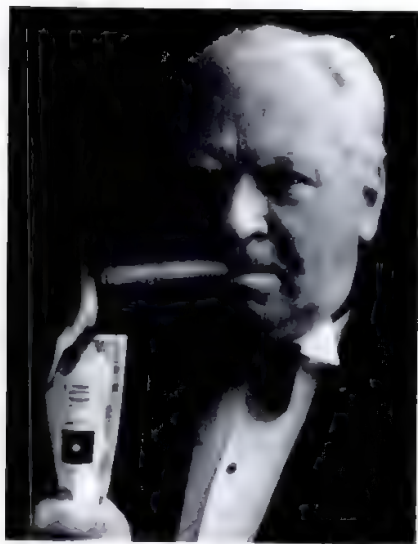
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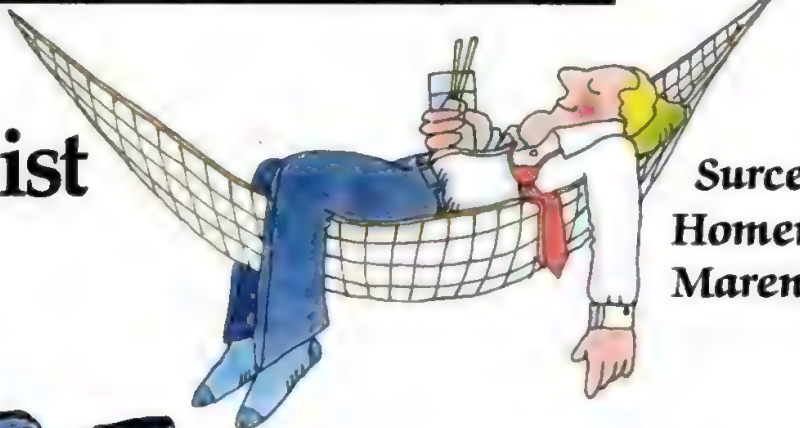
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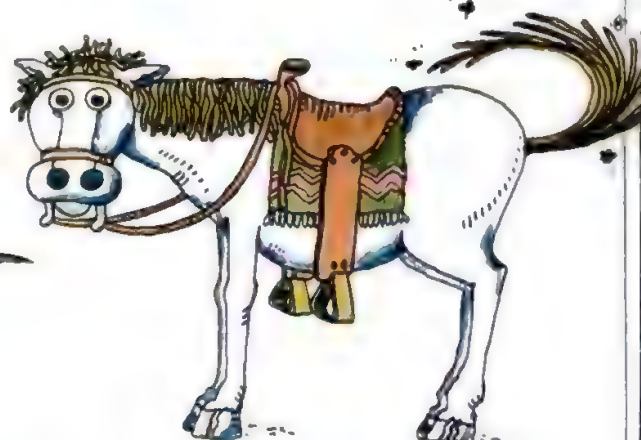
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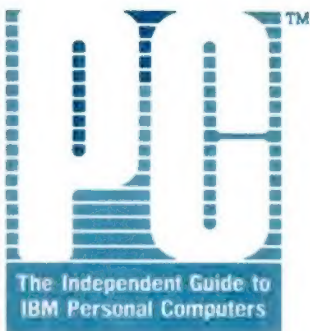
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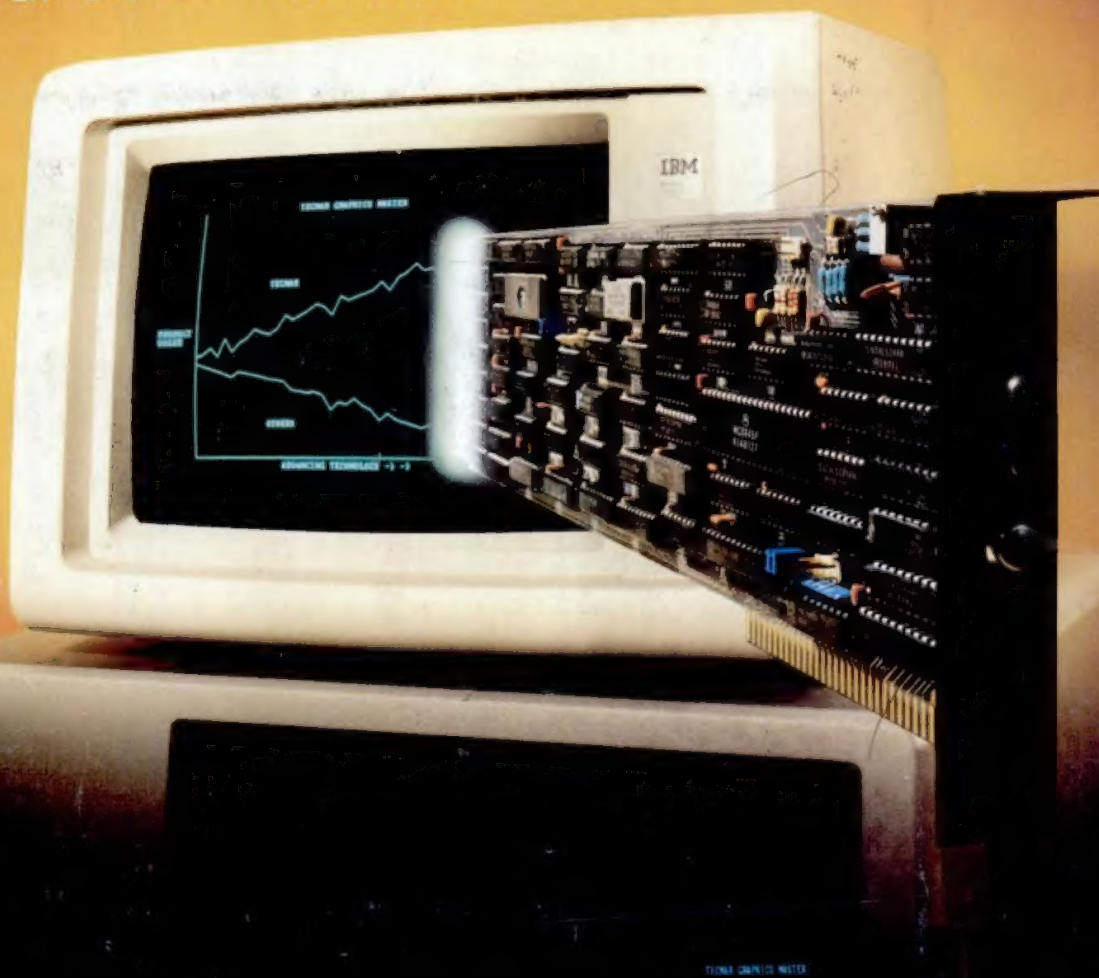
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